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AUTHOR	Suhorsky, Joseph; Wall, Robert E.
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ABSTRACT

A longitudinal study was conducted in three Maryland counties to determine the predictive validity of the Maryland Systematic Teacher Observation Instrument (MSTOI) and other initial assessment instruments as screening devices to identify kindergarten children with potential reading and/or learning difficulties. The MSTOI was also examined to determine its longitudinal validity as a predictor of children with reading and/or learning problems. Information collected in each county included data on initial tests, follow-up tests, concurrent validity, predictive validity, item analysis, and a discussion of procedures and results. It was determined that the predictive validity of MSTOI compared favorably with other initial assessment instruments. Predictive validity data on MSTOI was developed and its relationship to student progress and retention was established. Recommendations for further study are suggested. Summary tables for individual counties and combined data, descriptions of assessment instruments, and technical notes are appended. (MH)

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A VALIDATION STUDY OF THE EARLY IDENTIFICATION AND INTERVENTION PROGRAM SCREENING INSTRUMENTS

A LONGITUDINAL STUDY

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Joseph Suhorsky
Evaluation Consultant

Robert E. Wall
Evaluation Consultant

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Introduction

Prior to the introduction of House Bill 234 in the Maryland State Legislature, the Maryland State Department of Education organized a working conference to investigate practical ways for educators to identify and help children with potential learning/reading problems.

One of the outcomes of the conference, and of subsequent Maryland State Department of Education efforts, was the development of a basic plan to enable the local educational agencies to implement the provisions of Section 98C, Article 77 of the Annotated Code of Maryland. The basic plan, developed cooperatively with the local agency Early Identification Coordinators, has three components calling for: (1) early screening of all students, (2) administering continuous assessment of students, and (3) developing instructional strategies based on the screening and/or assessment findings.

It was apparent to all developers of the Early Identification Program that assessment instruments of good quality were essential to the success of the program. An ideal assessment instrument should be valid, reliable, easy to administer, and easily scored. Since no existing evaluative measure possessed all of these characteristics to an ideal level, certain compromises would have to be made in the selection of assessment measures. However, program success could be enhanced through careful planning of the assessment component. Therefore an overall test strategy was developed that required periodic evaluation of the program at different phases in the implementation of the Early Identification Program. Each

evaluation phase logically and systematically reviewed a portion of the assessment phase.

In the first phase, an evaluation study was performed that reported upon the development and validation of a systematic teacher observation instrument (1, 1975). It was reported that the systematic teacher observation instrument was valid and could be used to distinguish between normal children and special children in the kindergarten and in the first grade. An important outcome of this evaluation was the establishment of cutoff scores for the systematic teacher observation instrument. A second portion of this study reported the development and validation of a parent interview checklist. An analysis of the data indicated that the parent interview checklist in its present form was not useful for distinguishing between normal and special children. The final portion of the study identified and evaluated a number of standardized tests that were useful in identifying normal children and children with potential learning disabilities in the kindergarten and grade one.

In the second phase, several aspects of the assessment portion of the Early Identification Program were examined (2, 1976). First, the reliability of the Maryland Systematic Teacher Observation Instrument was determined, using the test-retest procedure. It was concluded that this instrument is reliable across time when used by the same teacher. A second area examined was the validity of a revised Parent Interview Checklist. An analysis of the data indicated that the Parent Interview Checklist was not valid for

identifying children with potential learning difficulties. This evaluation study reported that teachers using the Maryland Systematic Observation Instrument were identifying approximately 40% of the students as high risk students. This figure closely corresponds to the hypothesized figure of 40%. Finally, during this phase, a three year longitudinal study was initiated to determine the predictive validity of the Maryland Systematic Teacher Observation Instrument and selected standardized tests that were administered to children in the kindergarten.

The two studies above were primarily concerned with the development of an instrument and assessing the instrument's ability to identify special students. The present study was concerned primarily with determining the predictive validity of the MSTOI and the other assessment instruments for a population where there had been no intervention based on MSTOI performance.

Methodology

Purpose of the Study

The purpose of this longitudinal study was to determine the predictive validity of the Maryland Systematic Teacher Observation Instrument and other initial assessment instruments. The study specifically focused on a detailed analysis of the Maryland Systematic Teacher Observation Instrument (MSTOI) as a screening measure for identifying kindergarten children with potential reading/learning difficulties and as a predictor of continued identification of these children as having reading/learning problems at a future date.

Procedure and Sample Description

The study was conducted in Queen Anne's County, Wicomico County, and Cecil County. These counties were selected on the basis of their position in the Maryland State Department of Education plan for implementing the Early Identification and Intervention Program. Since these counties were not scheduled to implement the program before the completion of the study, it was possible to assess the predictive validity of the MSTOI in the absence of an intervention program based on diagnostic data.

The MSTOI was administered to all kindergarten children in these counties during the 1974-75 school year. The tests were administered and scored by the kindergarten teachers. In Queen Anne's County, the MSTOI was administered to 309 youngsters along with the Cognitive Skills Assessment Battery (CSAB) and the Classroom Behavior Inventory (CBI). In Wicomico County, the MSTOI was administered to 550 youngsters along with the CSAB and the CBI. In Cecil County, 435 MSTOI evaluations were made along with the administration of the Meeting Street School Screening Test (MSSST) and Self Control Behavior Inventory (SCBI) to 100 individuals. Each of these tests is described in Appendix B.

For the initial assessment instruments, cutoff scores were used to differentiate between those students judged as successful and those identified as having potential reading/learning problems. These cutoff scores were established in phase one of the evaluation program (1, 1975). For the MSTOI, a cutoff score of 139 was established. This score represented an average of the mean scores made by the normal and special groups in the norming sample. Any

student scoring less than 139 was classified as having potential reading/learning problems and subject to further testing. In establishing cutoff scores for the standardized tests used in the initial assessment, the procedure used was slightly different from the procedure used with the MSTOI. Cutoff scores for the CSAB, MSSST, CBI, and SCBI were established by first determining the mean on each test for the high and low sample group. For the low group, one standard deviation was added to the mean; for the high group, one standard deviation was subtracted from the mean. The higher of these two scores was established as the cutoff score. Using this procedure, the cutoff scores established were: 128 for the Cognitive Skills Assessment Battery, 58 for the Meeting Street School Screening Test, 32 for the Classroom Behavior Inventory, and 15 for the Self Control Behavior Inventory. A student scoring below these cutoff scores was identified as having a potential reading/learning problem.

The previously established cutoff scores were used for classifying students and for comparing performances on the various assessment measures. The criterion scores were conservative, since it was thought to be beneficial to over identify potential problems rather than miss some that might need attention. This rationale was justified on the basis that youngsters so identified were not to be placed until given further testing.

In the Spring of 1977, when the average subject was completing second grade, the follow-up criterion tests were administered to many of these youngsters. The two criterion instruments used were the Pupil Rating Scale (PRS) and the Peabody Individual Achievement

Test (PIAT). The PRS was used by the classroom teachers to evaluate the students. Since the PIAT is an individually administered test, one examiner in the county administered and scored the test.

Cutoff scores for the PIAT and the PRS were established by the evaluation consultants. A cutoff score of 102 was established for the PIAT and a score of 62 for the PRS. These scores represent a score one standard deviation below the mean of the national norms as supplied by the test publisher. The percentage of youngsters identified in this manner would be the lowest 15% of the national population. The guidelines from the Maryland State Department of Education indicated that approximately 15% of the students would require individualized services (3, 1975). The criterion measures would help to identify a group of comparable size.

Analysis

The data analysis was divided into three stages: (1) determination of concurrent validity, (2) determination of predictive validity, (3) determination of MSTOI item analysis. Assessment of concurrent validity and predictive validity was done by employing two procedures, each having certain advantages. The use of cutoff scores has practical advantages because it can be used to classify students. With cutoff scores, contingency tables can be developed that enable the calculation of X^2 to determine the existence of a significant relationship between the groups identified by the two different assessment instruments. After computing the chi-square value, the magnitude of the relationship could be determined by computing phi. A shortcoming of these statistical techniques

is the sensitivity to the cutoff score selected. That is, different values for cutoff scores produce varying values for chi-square and phi. Therefore, it was appropriate to examine the relationship between the two assessment instruments utilizing a procedure free from the shortcoming of the cutoff score. The Pearson Product Moment Correlation Coefficient was selected as an appropriate measure to assess the strength of the relationship between the total test scores as well as the relationship among the various subscores.

In the preliminary stage, the concurrent validity of the MSTOI was determined. Concurrent validity was assessed by determining the contingency coefficients and the Pearson Product Moment Correlation Coefficients between the MSTOI and the four other initial assessment instruments. The data in the study made it possible to determine concurrent validity with larger samples than had been used in the original validation studies of the MSTOI.

The major stage of the analysis was the determination of the predictive validity of the initial assessment instruments. Chi-square values were determined for each of the five initial assessment instruments using each of the two criterion measures. The reasons for employing two statistical techniques to determine validity are as stated previously.

Further analysis was performed on each MSTOI item to determine its relationship with: (1) the MSTOI total scores, (2) the MSTOI subscores, and (3) the total scores of the criterion tests.

By design, the set of tests used and the sampling procedures employed in each county were different. Results from Queen Anne's County will be presented first followed by Wicomico County and then

Cecil County. Results that are applicable to more than one county then will be reported and discussed.

Results - Queen Anne's County

Initial Tests

A total of 309 MSTOI tests was administered to kindergarten youngsters during the 1974-75 school year. From this group, the total of completed usable test forms was 305. The mean of the total score for the group was 145.13 with a standard deviation of 20.27. An analysis of the individual items for this initial sample is shown in Appendix A in Table A. (All lettered tables appear in Appendix A.)

In addition to the MSTOI, the CSAB was administered to each youngster. As shown in Table B, the mean of the total score was 108.40 and the standard deviation was 17.04.

At approximately the same time, these youngsters were rated using the Classroom Behavior Inventory. Valid observations were obtained on 308 youngsters. As shown in Appendix A, Table C, the mean for the total score was 29.94 with a standard deviation of 7.54.

Follow-up Tests

In the Spring of 1977, two criterion measures, the Peabody Individual Achievement Test (PIAT) and the Pupil Rating Scale (PRS), were administered to a sample of students. Since the PIAT required individual testing, a limited number of children were tested. Children were selected on a random basis and a total of 80 children were tested. The results of this are shown on Table D, Appendix A. The total test mean was 150.79 with a standard deviation of 33.24.

An attempt was made to locate all members of the initial sample and to administer the PRS to them. The classroom teachers rated 230 of the original sample with the PRS. The results are presented in Appendix A,

Table E. The mean of total scores was 74.16 and the standard deviation was 15.99. Values for subscales are also listed in the table.

In order to determine whether the follow-up sample was representative of the initial sample, the initial mean for MSTOI scores was compared to the follow-up MSTOI scores. The mean for the MSTOI follow-up sample was 145.80 with a standard deviation of 20.60. A z-test was performed and it was concluded that there was no significant difference between the initial and follow-up samples on the MSTOI total scores. Means and standard deviations of the MSTOI, CSAB, CBI follow-up samples are shown in Appendix A, Tables F-H.

Concurrent Validity

Utilizing the data from the follow-up sample, the concurrent validity of the MSTOI with the CSAB and the CBI was determined in two ways. Test scores were classified as either above or below the cutoff point for the test. In order to test the relationship between performance on two different tests, a contingency table was then developed. This table showed how many were above the cutoff point on both tests, below the cutoff point, or above on one test and below on the other. This information was than analyzed by the X^2 technique to test for a significant relationship or degree of association between the two tests. Phi coefficients and Pearson Product Moment Correlation Coefficients were calculated. As shown in Table 1, no student with a MSTOI score of less than 139, scored 128 or greater on the CSAB.

TABLE 1

Distribution Of Queen Anne's County Follow-up Sample
Classified By MSTOI Performance And CSAB Total Scores

MSTOI Total Score		CSAB Total Score		
		128 or Greater	Less than 128	Row Total
139 or Greater	N	24	138	162
	Row %	15	85	
	Col. %	100	68	71%
Less than 139	N	0	65	65
	Row %	0	100	
	Col. %	0	32	29%
Column Total	N	24	203	227
	%	11	89	100

Chi-square = 9.26 P < .01
Phi = .22

In Table 2, as in Table 1, the calculated X^2 value indicates that there was a significant degree of association between the MSTOI total scores and the other initial assessment instrument.

TABLE 2

Distribution Of Queen Anne's County Follow-up Sample
Classified By MSTOI Performance And CBI Total Scores

MSTOI Total Score		CBI Total Score		
		32 or Greater	Less than 32	Row Total
139 or Greater	N	109	55	164
	Row %	67	33	
	Col. %	94	48	71%
Less than 139	N	7	59	66
	Row %	11	89	
	Col. %	6	52	29%
Column Total	N	116	114	230
	%	50	50	100

Chi-square = 56.52 P < .01
Phi = .51

The Pearson Product Moment Correlation Coefficients were determined between the MSTOI and the CSAB and the CBI. Total score and subscale coefficients were significant at the .01 level. These data are shown in Table 3.

TABLE 3

Pearson Product Moment Correlation Coefficients Between MSTOI And The CSAB And The CBI For The Queen Anne's County Follow-up Sample

MSTOI Subscale	CSAB Total N=227	CBI Total N=230
Psychomotor	.69	.65
Language	.73	.70
Sensory/Perception	.71	.66
Cognition	.64	.65
Affect/Motivation	.56	.67
MSTOI Total	.72	.73

Note: All correlations significant at the .01 level.

The two analyses of the relationship between the MSTOI scores and the two other initial assessment instruments indicate that the MSTOI possesses concurrent validity. Using the MSTOI, teachers can assess the same behaviors assessed with standardized tests, the CSAB and the CBI.

Predictive Validity

The same statistical techniques were used to determine predictive validity as were used to determine concurrent validity. The criterion tests employed were the PIAT and the PRS. Tables 4-7 indicate the degree of relationship between the MSTOI and the criterion measures.

As shown in Table 4, a nonsignificant relationship between the MSTOI score classification and the PIAT score classification was found. It is interesting to note that 95% of the PIAT scores were above the cutoff level.

TABLE 4

Distribution Of Queen Anne's County Follow-up Sample Classified By MSTOI Performance And PIAT Total Scores (N=80)

MSTOI Total Score		PIAT Total Score		
		102 or Greater	Less than 102	Row Total
139 or Greater	N	58	1	59
	Row %	98	2	
	Col. %	76	25	74%
Less than 139	N	18	3	21
	Row %	86	14	
	Col. %	24	75	26%
Column Total	N	76	4	80
	%	95	5	100

Chi-square = 2.86 P = Not Significant
Phi = .25

As shown in Table 5, a significant correlation exists between the MSTOI and PIAT scores. The reader should note that the language subscales have at least as strong a relationship with the PIAT scores as the MSTOI total scores do.

TABLE 5

Pearson Product Moment Correlation Coefficients Between MSTOI And PIAT Scores For Queen Anne's County Follow-up Sample (N=80)

MSTOI Subscales	PIAT Subscales					
	Mathematics	Reading Recognition	Reading Comprehension	Spelling	General Information	PIAT Total
Psychomotor	.35	.28	.35	.26	.35	.40
Language	.39	.35	.44	.35	.42	.50
Sensory/Perception	.36	.35	.45	.35	.35	.47
Cognition	.28	.29	.38	.29	.30	.39
Affect/Motivation	.28	.18*	.28	.24*	.26	.32
MSTOI Total	.36	.28	.38	.31	.35	.43

Note: All correlations significant at the .01 level except those marked *.

Table 6 shows the results of the X^2 analysis which indicates that the relationship between the MSTOI and PRS score categories is significant at the .01 level. This is in contrast with results of a nonsignificant relationship noted between the MSTOI and PIAT score categories.

TABLE 6

Distribution Of Queen Anne's County Follow-up Sample
Classified By MSTOI Performance And PRS Total Scores

MSTOI Total Score		PRS Total Score		
		62 or Greater	Less than 62	Row Total
139 or Greater	N	146	18	164
	Row %	89	11	
	Col. %	80	38	71%
Less than 139	N	36	30	66
	Row %	55	45	
	Col. %	20	62	29%
Column Totals	N	182	48	230
	%	79	21	100

Chi-square = 31.82 $P < .01$
Phi = .38

The correlation between the MSTOI total score and the PRS total score was .53. Correlations among the PRS and MSTOI subscores are shown in Table 7. In this analysis also, the language subscore has as strong a relationship as the MSTOI total scores with PRS subscores.

TABLE 7

Pearson Product Moment Correlation Coefficients Between The MSTOI And PRS For Queen Anne's County Follow-up Sample (N=230)

MSTOI Subscores	PRS Subscores							
	Auditory Comprehension	Spoken Language	Orientation	Motor Coordination	Personal/Social Behavior	Verbal	Nonverbal	PRS Total
Psychomotor	.43	.46	.48	.43	.52	.46	.51	.52
Language	.56	.56	.53	.44	.55	.58	.53	.59
Sensory/ Perception	.50	.49	.51	.40	.51	.51	.50	.53
Cognition	.45	.41	.42	.32	.45	.44	.42	.45
Affect/ Motivation	.36	.36	.43	.43	.56	.37	.51	.48
MSTOI Total	.48	.48	.47	.42	.55	.49	.51	.53

Note: All correlations significant at the .01 level.

As shown in Table 8, a nonsignificant relationship was found between the CSAB classification and the PIAT score classification. Paradoxically, 96% of the PIAT scores were above the cutoff point, whereas for the same group 90% of the CSAB scores were below the cutoff point.

TABLE 8

Distribution Of Queen Anne's County Follow-up Sample
Classified By CSAB Performance And PIAT Total Scores

CSAB Total Scores		PIAT Total Scores		
		102 or Greater	Less than 102	Row Total
138 or Greater	N	8	0	8
	Row %	100	0	
	Col. %	11	0	10%
Less than 138	N	68	3	71
	Row %	96	4	
	Col. %	89	100	90%
Column Total	N	76	3	79
	%	96	4	100

Chi-square = .14 P = Not Significant
Phi = .07

The CSAB assesses five different competency areas. The correlation coefficients indicating a relationship among the CSAB and PIAT competency areas are shown in Table 9. A significant relationship was observed between the CSAB and PIAT total scores.

TABLE 9

Pearson Product Moment Correlation Coefficients Between CSAB And PIAT For Queen Anne's County Follow-up Sample (N=79)

CSAB Competency Areas	PIAT Subscores					
	Mathematics	Reading Recognition	Reading Comprehension	Spelling	General Information	PIAT Total
Orientation	.29	.25*	.46	.24*	.34	.40
Coordination	.23*	.31	.39	.24*	.15**	.33
Discrimination	.41	.46	.47	.36	.38	.53
Memory	.44	.37	.45	.29	.47	.52
Comprehension/ Concept	.43	.38	.50	.28	.54	.55
CSAB Total	.44	.41	.55	.31	.48	.56

Note: All unstarred are significant at the .01 level.
*Significant at .05 level,
**Not significant.

The predictive validity of the CSAB was determined, using the PRS as the criterion measure. Table 10 documents the results of classifying PRS and CSAB scores by the cutoff points. The calculated X^2 indicates a relationship significant at the .05 level.

TABLE 10

Distribution Of Queen Anne's County Follow-up Sample Classified By CSAB Performance And PRS Total Scores

CSAB Total Score		PRS Total Score		
		62 or Greater	Less than 62	Row Total
128 or Greater	N	24	0	24
	Row %	100	0	
	Col. %	13	0	10
Less than 128	N	158	47	205
	Row %	77	23	
	Col. %	87	100	90
Column Total	N	182	47	229
	%	80	20	100

Chi-square = 5.59 P < .05
Phi = .17

Correlation coefficients between the CSAB and PRS were calculated. The correlation of total CSAB with total PRS was .58. Correlations of the competency areas and the PRS scores are shown in Table 11.

TABLE 11

Pearson Product Moment Correlation Coefficients Between CSAB And PRS For Queen Anne's County Follow-up Sample (N=229)

CSAB Competency Areas	PRS Subscore		
	Verbal	Nonverbal	PRS Total
Orientation	.54	.44	.52
Coordination	.35	.35	.35
Discrimination	.49	.39	.46
Memory	.59	.49	.55
Comprehension/ Concept	.60	.46	.54
CSAB Total	.62	.50	.58

Note: All correlations significant at .01 level.

The predictive validity of the CBI was determined using the PIAT total scores as the criterion measure. These data are shown in Tables 12-15.

TABLE 12

Distribution Of Queen Anne's County Follow-up Sample Classified By CBI Performance And PIAT Total Scores

CBI Total Scores		PIAT Total Scores		
		102 or Greater	Less than 102	Row Total
32 or Greater	N	46	0	46
	Row %	100	0	
	Col. %	61	0	58%
Less than 32	N	30	4	34
	Row %	88	12	
	Col. %	39	100	42%
Column Total	N	76	4	80
	%	95	5	100

Chi-square = 3.49 P = Not Significant
Phi = .27

The predictive validity of CBI was further assessed by determining the correlation between CBI total scores and the PIAT scores. The results are shown in Table 13.

TABLE 13

Pearson Product Moment Correlation Coefficients Between The CBI Total Score And PIAT Scores For Queen Anne's County Follow-up Sample (N=80)

	PIAT Subscores					
	Mathematics	Reading Recognition	Reading Comprehension	Spelling	General Information	PIAT Total
CBI Total	.32	.27	.36	.27	.32	.39

Note: All correlations significant at .01 level.

Table 14 and 15 summarize the results of the predictive validity calculations for the CBI with PRS as a criterion measure.

The X^2 value obtained indicated a significant degree of relationship between the CBI and PRS score distribution. Table 14 shows the score distribution.

TABLE 14

Distribution Of Queen Anne's County Follow-up Sample Classified By CBI Performance And PRS Total Scores

CBI Total Scores		PRS Total Scores		
		62 or Greater	Less than 62	Row Total
32 or Greater	N	111	5	116
	Row %	96	4	
	Col. %	61	10	50%
Less than 32	N	72	43	115
	Row %	63	37	
	Col. %	39	90	50%
Column Total	N	183	48	231
	%	79	21	100

Chi-square = 36.41 $P < .01$
Phi = .41

The final calculation done in order to assess the predictive validity of the CBI was to calculate its correlation with the PRS. As shown in Table 15, a significant relationship between these measures was observed.

TABLE 15

Pearson Product Moment Correlation Coefficients Between CBI Total Score And PRS Score For Queen Anne's County Follow-up Sample (N=231)

	PRS Subscales		
	Verbal	Nonverbal	Total
CBI Total	.49	.53	.69

Note: All correlations significant at .01 level.

Item Analysis

In order to assess the predictive validity of the MSTOI, an item analysis was performed. Each MSTOI item and MSTOI subscale was compared to the MSTOI total score. Each MSTOI item and subscore was compared to the total score of each of the criterion measures. These data are shown in Tables 16 and 17.

TABLE 16

MSTOI Item Analysis Correlations Of Each Item With MSTOI Subscales And MSTOI Total Score For Queen Anne's County Follow-up Sample (N=230)

MSTOI Item	MSTOI Subscales					
	Psychomotor	Language	Sensory/ Perception	Cognition	Affect/ Motivation	MSTOI Total
1	.74	.57	.66	.49	.58	.63
2	.71	.73	.74	.67	.70	.77
3	.57	.78	.73	.80	.51	.74
4	.65	.66	.74	.84	.55	.75
5	.50	.49	.40	.34	.57	.54
6	.58	.73	.55	.51	.46	.62
7	.48	.50	.36	.35	.61	.52
8	.74	.52	.77	.73	.54	.69
9	.80	.69	.73	.67	.80	.80
10	.72	.88	.78	.80	.66	.85
11	.75	.80	.74	.71	.72	.80
12	.68	.73	.69	.73	.61	.78
13	.37	.24	.28	.37	.45	.39
14	.53	.40	.53	.65	.46	.56
15	.36	.20	.21	.16	.66	.37
16	.50	.63	.74	.83	.44	.69
17	.63	.65	.69	.80	.55	.73
18	.46	.40	.33	.36	.55	.48
19	.62	.57	.68	.81	.53	.70
20	.53	.60	.53	.54	.60	.62
21	.67	.59	.73	.60	.64	.72
22	.44	.23	.28	.21	.68	.42
23	.63	.63	.41	.36	.47	.53
24	.74	.81	.77	.71	.76	.84
25	.46	.23	.30	.25	.71	.45
26	.58	.57	.73	.78	.52	.70
27	.56	.43	.51	.49	.74	.62
28	.60	.85	.73	.74	.55	.77
29	.49	.36	.30	.33	.46	.44
30	.63	.59	.81	.77	.48	.70
31	.59	.60	.71	.85	.48	.70
32	.59	.68	.74	.83	.53	.74
33	.65	.68	.57	.59	.61	.69
34	.61	.64	.74	.53	.51	.66
35	.51	.76	.68	.53	.49	.67
36	.49	.76	.63	.50	.47	.64
Psychomotor		.81	.85	.76	.82	.91
Language			.84	.82	.72	.92
Sensory/Perception				.89	.71	.93
Cognition					.67	.90
Affect/Motivation						.88

Note: All correlations significant at the .01 level.

TABLE 17

MSTOI Item Analysis
Correlations Of Each MSTOI Item And Subscale With The Total PIAT (N=80) And PRS (N=230) Criterion Measures For Queen Anne's County Follow-up Sample

MSTOI Item	MSTOI Subscales						
	Psychomotor	Language	Sensory/ Perception	Cognition	Affect/ Motivation	PIAT Total	PRS Total
1	.74	.57	.66	.49	.58	.31	.42
2	.71	.73	.74	.67	.70	.31	.51
3	.57	.78	.73	.80	.51	.43	.48
4	.65	.66	.74	.84	.55	*.23	.30
5	.50	.49	.40	.34	.57	**-.02	.36
6	.58	.73	.55	.51	.46	.35	.42
7	.48	.50	.36	.35	.61	**.15	.23
8	.74	.52	.77	.73	.54	.31	.29
9	.80	.69	.73	.67	.80	.29	.51
10	.72	.88	.78	.80	.66	.45	.48
11	.75	.80	.74	.71	.72	.40	.57
12	.68	.79	.69	.73	.61	.31	.38
13	.37	.24	.28	.37	.45	**.15	.05
14	.53	.40	.53	.65	.46	**.10	.14
15	.36	.20	.21	.16	.66	*.21	.17
16	.50	.63	.74	.83	.44	.43	.37
17	.63	.65	.69	.80	.55	**.18	.27
18	.46	.40	.33	.36	.55	**.02	.27
19	.62	.57	.68	.81	.53	*.20	.30
20	.53	.60	.53	.54	.60	.30	.38
21	.67	.59	.73	.60	.64	.29	.32
22	.44	.23	.28	.21	.68	*.20	.19
23	.63	.63	.41	.36	.47	.37	.32
24	.74	.81	.77	.71	.76	.37	.58
25	.46	.23	.30	.25	.71	**.11	.15
26	.58	.57	.73	.78	.52	*.23	.26
27	.56	.43	.51	.49	.74	**.11	.29
28	.60	.85	.73	.74	.55	.37	.55
29	.49	.36	.30	.33	.46	**-.04	.23
30	.63	.59	.81	.77	.48	.34	.30
31	.59	.60	.71	.85	.48	.28	.27
32	.59	.68	.74	.83	.53	*.24	.40
33	.65	.68	.57	.59	.61	*.24	.29
34	.61	.64	.74	.53	.51	.43	.50
35	.51	.76	.68	.53	.49	.33	.54
36	.49	.76	.63	.50	.47	.35	.51
Psychomotor		.81	.85	.76	.82	.40	.45
Language			.84	.82	.72	.50	.53
Sensory/Perception				.89	.71	.47	.48
Cognition					.67	.39	.39
Affect/Motivation						.32	.41
MSTOI Total						.43	.53

All unmarked correlations significant at the .01 level.
*Significant at the .05 level.
**Not significant

Discussion

A summary of the validity indices for the initial assessment instruments is shown in Table 18.

TABLE 18

Validity Indices For The MSTOI, CSAB And CBI For Queen Anne's County Follow-up Sample

	X^2	r
Concurrent Validity		
MSTOI with CSAB	9.26	.72
MSTOI with CBI	56.52	.73
Predictive Validity		
MSTOI with PRS	31.82	.53
CSAB with PRS	5.59*	.58
CBI with PRS	36.41	.69
MSTOI with PIAT	2.86**	.43
CSAB with PIAT	.14**	.56
CBI with PIAT	3.49**	.39

**Not significant at the .05 level.
*Significant at the .05 level.
All other values significant at the .01 level.

While interpreting the data in Table 17, the reader should be cognizant of certain statistical assumptions and constraints. In this study the X^2 was used primarily for testing for the relationships between dichotomized score distributions. The distributions tested were indicated by the student performance on various assessment instruments. Obviously the cutoff score used will influence the magnitude of the obtained X^2. An advantage associated with this procedure is that students are classified as a teacher would be required to classify them when interpreting MSTOI test results. In addition, the contingency table, an initial step in calculating X^2, provides a graphic presentation of score distributions.

On the other hand, the Pearson Product Moment Correlation Coefficient procedure gives a more precise estimate of the degree of relationship between the various assessment instruments. Since the Pearson Product Moment Correlation Coefficient utilizes the entire continuum of scores, it is not cutoff score dependent. Further, Pearson Product Moment Correlation Coefficients can be used to determine relationships among various subscores. Pearson Product Moment Correlation Coefficients also can be analyzed to determine the existence of a statistically significant difference between correlation coefficients.

The results presented in this table are based on data from one sample and caution should be exercised when generalizing results.

In assessing the concurrent validity, it was noted that the MSTOI related as strongly to the CSAB as to the CBI. As might be expected, the concurrent validity coefficients are higher than the predictive validity coefficients. This normally is the case since there are fewer intervening variables over a shorter period of time.

When examining the predictive validity coefficients, it is interesting to note that all of the Pearson Product Moment Correlation Coefficients are significant at the .01 level. Whereas none of the X^2 relationships between the initial assessment instruments and the PIAT are significant. A possible explanation for this apparent inconsistency may be the selection of inappropriate cutoff scores. For example, the MSTOI score was established to select the bottom 40% of those tested for further attention. In the Queen Anne's County follow-up sample, 21% scored below the cutoff score. For the PIAT, only 5% scored below the cutoff while on the other criterion test, the PRS, 21% scored below the cutoff. It must be noted that the various cutoff scores were selected as standards for the State of Maryland and these anomalous

results may have been due to factors indigenous to this county.

A t-test for testing for differences between dependent correlations revealed that only the predictive validity coefficient for the CBI with the PRS was significantly higher than the MSTOI predictive validity coefficient (t=2.95). In other words, the MSTOI predictive validity coefficient was as good as the validity coefficients of the CSAB and the CBI in three out of four comparisons. Although all of the validity correlation coefficients are significant at the .01 level or better, it must be noted that the chi-square (X^2) values were not always significant. This seems especially evident in the CSAB and PIAT analyses. A possible explanation for this apparent inconsistency may be the selection of inappropriate cutoff scores used in the contingency table.

A rather intensive item and subscale analysis of the MSTOI was performed. The results may be summarized as follows: 1) all of the subscales had predictive validity coefficients significant at the .01 level for both criteria (PIAT and PRS total scores), 2) all individual items were related significantly to the total MSTOI score and to at least one criterion total score (in general the items related significantly with both criteria), 3) the relationship between the MSTOI items and the PRS was apparently higher than for the PIAT.

The intercorrelations among the five subscales are striking in that the majority are in the .80 to .89 range. This degree of interrelatedness is reflected in the generally consistent size of correlation coefficients for a particular MSTOI item. This is true with each of the five subscales. There are several possible explanations for these findings. One reason may be that the various skills measured by the MSTOI are very highly related and therefore one would expect a high degree of interrelatedness among the various items and subscales. Another possibility is that the "halo effect" reduces the

variability among item ratings. For example, the teacher that has an overall impression of the child may tend to rate the student similarly on all items. The extent to which these explanations are valid cannot be determined from the data. However, it seems reasonable to state the subscores present little additional statistical information beyond that provided by the total score. However, these subscale scores may provide useful diagnostic information for planning educational programs.

Results - Wicomico County

Initial Tests

During the 1974-75 school year, all 550 kindergarten youngsters in Wicomico County were evaluated using the MSTOI. From this group a total of 546 usable test forms were obtained. The mean of the total MSTOI score was 149.10 with a standard deviation of 19.95. Individual item means and subscore means are shown in Appendix A, Table I.

In addition to the MSTOI, the Cognitive Skills Achievement Battery (CSAB) was administered to each kindergarten youngster. As a result of this testing, 546 usable CSAB test scores were obtained. The mean of the total score was 108.94 and the standard deviation was 17.55. These data are shown in detail in Appendix A, Table J.

The youngsters were also rated using the Classroom Behavior Inventory. Observations were made at approximately the same time during the year. A total of 546 valid forms were available. For this initial sample, a mean of 28.89 was calculated with a standard deviation of 8.69. Subscale scores are shown in Table K in Appendix A.

Follow-up Tests

The criterion measure, the Pupil Rating Scale (PRS), was administered to all of the initial sample that could be located. A total of 387 students were included in this follow-up sample. An analysis of the PRS

test data for these youngsters showed a total score mean of 75.88 with a standard deviation of 16.98. Additional information on the subscale scores is shown in Table L in Appendix A.

The possibility of a systematic change in sample composition was investigated by comparing the mean scores of MSTOI initial sample with the mean score of the follow-up sample. On the initial sample, the MSTOI mean was 149.10 with a standard deviation of 19.95. On the follow-up sample, the MSTOI mean was 151.06 with a standard deviation of 18.33. Subscale scores for the follow-up sample are shown in Table M. A t-test was performed and the results showed no significant differences at the .05 level. Since there was no significant difference between the samples, results from the follow-up sample can be generalized to the initial sample.

Concurrent Validity

The concurrent validity of the MSTOI for assessing Wicomico County students was established by determining the relationship between students' MSTOI ratings and their ratings on the other initial instruments. The results are summarized in tables 19-21. Table 19 indicates the distribution of CSAB and MSTOI scores when they are classified as either above or below the cutoff point. The results from the X^2 analysis indicated a statistically significant degree of association between MSTOI and CSAB ratings. This apparent relationship is shown in the fact that no student who was placed below the cutoff point on the MSTOI scored above the CSAB total score cutoff point.

Table 19

Distribution Of Wicomico County Follow-up Sample
Classified By MSTOI Performance And CSAB Total Scores

MSTOI Total Score		CSAB Total Score		
		128 or Greater	Less than 128	Row Total
139 or Greater	N	48	264	312
	Row %	15	85	
	Col. %	100	79	81%
Less than 139	N	0	72	72
	Row %	0	100	
	Col. %	0	21	19%
Column Total	N	48	336	384
	%	13	87	100

Chi-square = 11.29 $P < .01$
Phi = .18

Table 20 indicates the distribution of MSTOI and CBI scores that have been classified according to the cutoff points for these tests. The statistically significant X^2 value computed indicated a significant relationship between MSTOI scores and CBI scores i.e. concurrent validity. It is interesting to note that over one half of the students were classified below the cutoff point for the CBI whereas only 19% of the students were found to be below the MSTOI cutoff score.

TABLE 20

Distribution Of Wicomico County Follow-up Sample
Classified By MSTOI Performance And CBI Total Scores

MSTOI Total Score		CBI Total Score		
		32 or Greater	Less than 32	Row Total
139 or Greater	N	169	142	311
	Row %	53	46	
	Col. %	97	68	81%
Less than 139	N	6	68	74
	Row %	8	92	
	Col. %	3	32	19%
Column Total	N	175	210	385
	%	46	54	100

Chi-square = 49.68 $P < .01$
Phi = .37

A second procedure for determining the concurrent validity of the MSTOI was employed. The reasons for testing the relationship between MSTOI performance and the other initial testing instruments with the Pearson Product Moment Correlational technique as well as the X^2 were discussed in the section dealing with the Queen Anne's County results. In general, it might be appropriate to say that the X^2 technique provides results that have greater understandability and relevance to the classroom teacher. The Pearson Product Moment technique utilizes the data more completely and provides results that are more precise and amenable to further statistical analysis. All of the correlation coefficients indicated a significant .01 level relationship between MSTOI ratings and the other test performances. In this analysis, the correlations of the MSTOI with the CSAB and CBI were computed. These data are shown in Table 21.

TABLE 21

Pearson Product Moment Correlation Coefficients Between MSTOI Scores And The CSAB And The CBI For The Wicomico County Follow-up Sample

MSTOI Subscales	CSAB Total N=384	CBI Total N=385
Psychomotor	.64	.62
Language	.74	.62
Sensory/Perception	.74	.61
Cognition	.70	.54
Affect/Motivation	.56	.65
MSTOI Total	.75	.67

Note: All correlations significant at the .01 level.

Additional information concerning the relationship of the MSTOI with the CSAB and CBI subscales is shown in Appendix A, Tables N and O.

Predictive Validity

The predictive validity of the initial assessment instruments, MSTOI, CSAB and CBI was determined by calculating the contingency coefficients and the Pearson Product Moment Correlation Coefficients with the criterion measure, the PRS. Tables 22-27 present the results of this aspect of the validity study. All statistical indicators of predictive validity were significant at the .01 level. Table 22 indicates the distribution of MSTOI and PRS scores classified as either above or below the cutoff score for the respective test. The calculated X^2 indicated that there is a statistically significant degree of association between performances on the two tests.

TABLE 22

Distribution Of Wicomico County Follow-up Sample
Classified By MSTOI Performance And PRS Total Score

MSTOI Total Score		PRS Total Score		
		62 or Greater	Less than 62	Row Total
139 or Greater	N	277	35	312
	Row %	89	11	
	Col. %	87	51	81%
Less than 139	N	40	34	74
	Row %	54	46	
	Col. %	13	49	19%
Column Total	N	317	69	386
	%	82	18	100

Chi-square = 46.80 $P < .01$
Phi = .36

Table 23 summarizes the results of analyzing the relationship between the various MSTOI and PRS scales with the Pearson Product Moment Correlation technique. The predictive validity of the MSTOI total score when using the PRS total score as the criterion is .52. Inspection of the correlation coefficients indicating the relationships among the various subscale scores reveals that the MSTOI language subscale possess predictive validity coefficients of approximately the same magnitude as the MSTOI total score. The PRS Motor Coordination subscale is notable in that its coefficients appear to be of a lower order than the other subscales.

TABLE 23

Pearson Product Moment Correlation Coefficients Between The MSTOI And PRS For The Wicomico County Follow-up Sample (N=386)

MSTOI Subscores	PRS Subscores							
	Auditory Comprehension	Spoken Language	Orientation	Motor Coordination	Personal/Social Behavior	Verbal	Nonverbal	PRS Total
Psychomotor	.42	.43	.40	.24	.46	.46	.45	.47
Language	.48	.48	.42	.27	.45	.51	.45	.50
Sensory/ Perception	.44	.47	.41	.28	.44	.48	.43	.48
Cognition	.38	.41	.33	.18	.37	.43	.35	.40
Affect/ Motivation	.42	.41	.42	.23	.49	.44	.47	.48
MSTOI Total	.48	.49	.43	.27	.40	.52	.48	.52

Note: All correlations significant at the .01 level.

The predictive validity of CSAB was determined by developing a contingency table and by determining the correlation with the criterion measure. Score distributions of the CSAB and PRS are shown in Table 24. Table 25 presents the results of Pearson Product Moment Correlation analysis. All calculated values were significant at the .01 level.

TABLE 24

Distribution Of Wicomico County Follow-up Sample Classified By CSAB Performance And PRS Scores

CSAB Total Scores		PRS Total Score		
		62 or Greater	Less than 62	Row Total
128 or Greater	N	47	1	48
	Row %	98	2	
	Col. %	15	1	12%
Less than 128	N	268	69	337
	Row %	80	20	
	Col. %	85	99	87%
Column Total	N	315	70	385
	%	82	18	100

Chi-square = 8.36 $P < .01$
Phi = .16

The predictive validity of the CSAB with the PRS as the criterion was indicated by the correlation coefficient of .50. Correlation coefficients indicating the relationships among the competency areas and the PRS subtotals are shown in Table 25. All computed values were significant.

TABLE 25

Pearson Product Moment Correlation Coefficients Between CSAB Scores And PIAT For Wicomico County Follow-up Sample (N=385)

CSAB Competency Areas	PRS Subscores		
	Verbal	Nonverbal	Total
Orientation	.51	.44	.49
Coordination	.33	.34	.35
Discrimination	.46	.39	.44
Memory	.49	.44	.48
Comprehension/ Concept	.52	.44	.50
CSAB Total	.56	.48	.54

Note: All correlations significant at the .01 level.

The predictive validity of the initial assessment measure, the CBI, with the PRS as a criterion measure is summarized in Tables 26 and 27. All calculated values were significant at the .01 level. Distribution of the CBI scores and the PRS scores according to their cutoff points are documented in Table 26.

TABLE 26

Distribution Of Wicomico County Follow-up Sample Classified By CBI Performance And PRS Total Scores

CBI Total Scores		PRS Total Scores		
		62 or Greater	Less than 62	Row Total
32 or Greater	N	163	12	175
	Row %	93	7	
	Col. %	52	17	45%
Less than 32	N	153	58	211
	Row %	73	27	
	Col. %	48	83	55%
Column Total	N	316	70	386
	%	82	18	100

Chi-square = 26.05 $P < .01$
Phi = .27

The predictive validity of the CBI was established by determining its correlational relationship with the criterion PRS scores. The correlations were significant at the .01 level. These data are shown in Table 27.

TABLE 27

Pearson Product Moment Correlation Coefficients Between CBI Total Scores And PRS Scores For Wicomico County Follow-up Sample (N=386)

	PRS Subscales		
	Verbal	Nonverbal	Total
CBI Total	.42	.43	.45

Note: All correlations significant at the .01 level.

Item Analysis

In order to assess the predictive validity of the MSTOI, an item analysis was performed. A correlation coefficient was computed indicating the relationship of each MSTOI item and MSTOI subscale score with the MSTOI total score and the PRS criterion measure. All coefficients are significant at the .01 level. These data are shown in Table 28.

TABLE 28

MSTOI Item Analysis
Correlations Of Each Item With Total MSTOI Score And PRS
Criterion Measure For Wicomico County Follow-up Sample (N=386)

MSTOI Item	MSTOI Subscales						
	Psychomotor	Language	Sensory/ Perception	Cognition	Affect/ Motivation	MSTOI Total	PRS Total
1	.77	.56	.61	.47	.63	.65	.41
2	.58	.57	.59	.50	.60	.63	.41
3	.57	.74	.60	.70	.50	.68	.33
4	.47	.55	.45	.72	.41	.58	.24
5	.58	.41	.41	.36	.55	.54	.26
6	.68	.73	.53	.49	.63	.69	.35
7	.49	.42	.31	.29	.66	.51	.24
8	.64	.57	.64	.60	.41	.60	.24
9	.76	.62	.64	.56	.77	.73	.42
10	.64	.84	.67	.67	.56	.75	.37
11	.71	.72	.68	.67	.72	.77	.51
12	.48	.62	.55	.64	.32	.57	.34
13	.40	.33	.26	.27	.49	.41	.24
14	.41	.47	.41	.60	.33	.49	.24
15	.52	.34	.30	.32	.72	.50	.29
16	.54	.61	.74	.76	.51	.68	.33
17	.54	.54	.62	.71	.38	.60	.26
18	.51	.43	.35	.40	.61	.53	.26
19	.48	.49	.53	.68	.39	.57	.30
20	.62	.56	.55	.46	.68	.65	.37
21	.41	.44	.63	.46	.31	.50	.34
22	.43	.31	.30	.29	.66	.47	.25
23	.60	.59	.43	.44	.40	.52	.32
24	.71	.73	.69	.63	.75	.78	.50
25	.51	.38	.37	.38	.70	.54	.30
26	.46	.50	.59	.67	.42	.57	.33
27	.61	.49	.46	.46	.78	.64	.26
28	.60	.83	.68	.66	.56	.74	.41
29	.65	.43	.34	.34	.60	.54	.21
30	.50	.57	.74	.59	.39	.60	.34
31	.44	.58	.56	.73	.37	.59	.30
32	.52	.59	.59	.72	.47	.63	.32
33	.54	.72	.56	.54	.45	.63	.33
34	.54	.59	.72	.53	.47	.63	.31
35	.48	.58	.65	.43	.44	.59	.42
36	.53	.76	.67	.58	.48	.68	.44
Psychomotor		.80	.78	.69	.83	.89	.46
Language			.83	.83	.70	.93	.49
Sensory/Perception				.84	.66	.91	.47
Cognition					.62	.88	.39
Affect/Motivation						.86	.47
MSTOI Total							.50

Note: All values significant at the .01 level.

Discussion

Analysis of the Wicomico County data revealed that the MSTOI possesses both concurrent and predictive validity. A summary of these data are shown in Table 29 and a discussion of the data in the table follows.

TABLE 29

Summary Of Validity Indices For The MSTOI, CBI, And CSAB In Wicomico County

	X^2	r
Concurrent Validity		
MSTOI with CSAB	11.29	.75
MSTOI with CBI	49.68	.67
Predictive Validity		
MSTOI with PRS	46.80	.52
CSAB with PRS	8.36	.54
CBI with PRS	26.05	.45

Note: All values significant at the .01 level.

In the discussion of the results, the Pearson Product Moment Correlational analysis will be presented first and will be followed by a discussion of the X^2 analysis of data. The MSTOI concurrent validity correlation coefficients of .67 and .75 indicate a strong relationship with the initial assessment instruments. Of major concern in this study, however, was the predictive validity of the initial assessment instruments, the MSTOI, CSAB and CBI. For predictive validity, the correlation coefficients ranged from .45 to .54. In order to determine whether one test was a significantly better predictor, a t-test was done on the dependent correlations. No significant differences were found in the dependent correlations. It was concluded that all three initial assessment instruments were equally good predictors when the PRS was used as the criterion instrument.

Examination of the chi-square data showed that the MSTOI had concurrent validity at .01 level of significance. The predictive validity as determined by X^2 showed that all of the initial assessment instruments had significant predictive validity at the .01 level. As shown in Table 29, however, there was a wide difference in actual X^2 values obtained. In part, this range can be explained by examining the cutoff scores for various instruments and the resulting proportion of the sample identified as falling below the cutoff point. An examination of the data for this county showed that when the MSTOI was used, approximately 19% of the sample scored below the MSTOI cutoff point. In contrast, the percentage of students scoring below the cutoff point on the CSAB and the CBI was 88% and 54% respectively.

Earlier data had indicated that the percentage of students rated below the 139 cutoff score would be approximately 40%. The wide discrepancy between an anticipated 40% and the observed 19% may be attributed to several factors. First, the sample may well represent a group of students who are above average ability when compared to the rest of the state. A second explanation is that since all MSTOI tests were not administered in the first eight weeks of the school, students progressed sufficiently during the school year to be evaluated as being above the cutoff score. Third, teacher bias may have developed where teachers tend to evaluate students above the cutoff score. Such an evaluation bias would reduce the number of EMP's written for students. The extent or existence of these practices cannot be determined from the data available.

It may be hypothesized that the high percentage of students scoring below the cutoff point on the CSAB can be attributed to the high cutoff score used with this test. Although the number of students falling

below the CBI cutoff point was 54%, these data may indicate that the sample is a group that has less ability than the norm population.

The results of the item analysis may be summarized as follows: 1) all individual items were related significantly with the total MSTOI score and with the PRS criterion measure, 2) all of the subscales had validity coefficients significant at .01 level with the criterion measure total score, 3) all of the subscores were intercorrelated significantly. The interrelationships among the five subscales ranged from .62 to .84.

Results - Cecil County

Initial Tests

In Cecil County, the MSTOI was used to evaluate all of the kindergarten youngsters. A total of 435 usable test forms were obtained. The mean for this population was 145.00 with a standard deviation of 23.19. Individual item means and subscale means are shown in Table P, Appendix A.

On the basis of the total MSTOI scores, 100 youngsters were selected for additional testing. The youngsters with the fifty highest MSTOI scores and the youngsters with the fifty lowest scores were chosen for additional testing. Where possible, the Meeting Street School Screening Test (MSSST) and the Self Control Behavior Inventory (SCBI) were administered to these children. From this group, 88 usable pairs of MSSST and SCBI scores were obtained. This group of 88 was designated as the initial sample. Since the selection of the initial sample was not random, it was necessary to know whether the initial sample significantly differed from population on the MSTOI scores. The mean of the initial sample for the MSTOI was 141.18 with a standard deviation of 33.00. A t-test was conducted to assess the

significance of the difference in the means between the population and the initial sample. Results of the t-test indicated the means of these samples differed significantly at the .01 level of confidence. Therefore it was concluded that all statistical analysis by necessity would be limited to the initial sample and could not be generalized to the population.

For the initial sample, the mean total score on the MSSST was 48.43 with a standard deviation of 20.68. The MSSST subscales are shown in Table Q. On the SCBI, the mean of the total score was 13.41 with a standard deviation of 7.86.

Follow-up Study

In any longitudinal study, a sample loss can be predicted. In this case, the original 88 usable scores was reduced to a 79 follow-up sample. The criterion measures, the PIAT and PRS, were administered to these 79 youngsters. Criterion measures were administered in the spring of 1977. Results showed a PIAT total score mean of 160.84 with a standard deviation of 58.36. For the follow-up sample, the total score on the PRS for the total score was 79.38 with a standard deviation of 22.40. Subscale scores on the criterion measures are shown in Tables R and S in Appendix A.

Prior to proceeding with any additional data analysis, the MSTOI total score mean for the initial sample was compared with the MSTOI total score mean for the follow-up sample. The mean for the initial sample was 141.18 while the mean for the follow-up sample was 136.01. Data for the MSTOI follow-up are shown in detail in Table T. No significant difference in the means was detected with a t test. From this result, it was inferred that all future calculations could be made using the data from the follow-up sample. All conclusions

reached could be generalized to the initial sample but not to the population. Follow-up data for the MSSST is shown in Table U. The SCBI follow-up sample mean is 11.03 with a standard deviation of 8.44.

Concurrent Validity

An analysis was done to determine the concurrent validity of MSTOI. First, the MSTOI total score distribution was determined with the score distributions of MSSST. These results are shown in Table 30. The relationship of the score distributions was significant at the .01 level.

TABLE 30

Distribution Of Cecil County Follow-up Sample
Classified By MSTOI Performance And MSSST Total Scores

MSTOI Total Score		MSSST Total Scores		
		58 or Greater	Less than 58	Row Total
139 or Greater	N	25	11	36
	Row %	69	31	
	Col. %	96	26	52%
Less than 139	N	1	32	33
	Row %	3	97	
	Col. %	4	74	48%
Column Total	N	26	43	69
	%	38	62	100

Chi-square = 29.57 P < .01
Phi = .68

The concurrent validity of the MSTOI also was determined by examining the relationship between MSTOI total score distribution and SCBI total score distribution. These data are shown in Table 31. The relationship between the scores on the two rating instruments was significant at the .01 level.

TABLE 31

Distribution Of Cecil County Follow-up Sample
Classified By MSTOI Performance And SCBI Total Scores

MSTOI Total Score		SCBI Total Score		
		15 or Greater	Less than 15	Row Total
139 or Greater	N	31	5	36
	Row %	86	14	
	Col. %	97	14	53%
Less than 139	N	1	31	32
	Row %	3	97	
	Col. %	3	86	47%
Column Total	N	32	36	68
	%	47	53	100

Chi-square = 43.56 P < .01
Phi = .83

The concurrent validity of the MSTOI was determined by computing the Pearson Product Moment Correlation Coefficients for the MSTOI with the two initial assessment instruments, the MSSST and the SCBI. MSTOI total score with the total score on the MSSST showed a correlation of .68. The Pearson Product Moment Correlation Coefficient for the MSTOI total score with the SCBI total score was .76. Correlations for the various subscores are shown in Table 32. The relationship between the two teacher rating instruments was consistently higher than the relationship between the MSTOI and the MSSST. All relationships were significant at .01 level.

TABLE 32

Pearson Product Moment Correlation Coefficients Between MSTOI Scores And MSSST And SCBI Scores For Cecil County Follow-up Sample (N=68)

MSTOI Subscales	MSSST Subscores				
	Motor Patterning	Visual Perceptual Motor	Language	MSSST Total	SCBI Total
Psychomotor	.63	.66	.71	.68	.75
Language	.63	.64	.69	.68	.74
Sensory/ Perception	.64	.66	.69	.69	.73
Cognition	.62	.64	.66	.66	.71
Affect/ Motivation	.61	.63	.65	.65	.76
MSTOI Total	.63	.66	.69	.68	.76

Note: All correlations significant at .01 level.

Predictive Validity

The predictive validity of the three initial assessment instruments was determined by examining the score distribution of the initial assessment instruments and of the criterion measures Peabody Initial Achievement Test (PIAT) and Pupil Rating Scale (PRS). Predictive validity also was determined by computing the Pearson Product Moment Correlation Coefficients between the three initial assessment instruments and the two criterion measures.

The distribution of scores for the MSTOI initial assessment measure and the PIAT criterion measure are shown in Table 33. It should be noted that relationship between scores was significant at the .01 level. No students scoring above 139 on the MSTOI scored below the PIAT cutoff point.

TABLE 33

Distribution Of Cecil County Follow-up Sample
Classified By MSTOI Performance And PIAT Total Scores

MSTOI Total Score		PIAT Total Score		
		102 or Greater	Less than 102	Row Total
139 or Greater	N	40	0	40
	Row %	100	0	
	Col. %	63	0	51%
Less than 139	N	24	15	39
	Row %	62	38	
	Col. %	37	100	49%
Column Total	N	64	15	79
	%	81	19	100

Chi-square = 16.57 $P < .01$
Phi = .49

The Pearson Product Moment Correlation between the MSTOI total scores and the PIAT total scores was .85. Correlation for the subscores are shown in Table 34. All correlations were significant at the .01 level.

TABLE 34

Pearson Product Moment Correlation Coefficients Between MSTOI And PIAT Scores For Cecil County Follow-up Sample (N=79)

MSTOI Subscales	PIAT Subscales					
	Mathematics	Reading Recognition	Reading Comprehension	Spelling	General Information	PIAT Total
Psychomotor	.77	.85	.86	.83	.70	.86
Language	.77	.84	.85	.83	.71	.85
Sensory/Perception	.80	.84	.87	.84	.71	.87
Cognition	.72	.77	.79	.77	.64	.79
Affect/Motivation	.77	.82	.82	.76	.70	.83
MSTOI Total	.77	.83	.85	.81	.71	.85

Note: All correlations are significant at the .01 level.

The distribution of the Cecil County follow-up sample classified by MSTOI total scores and the criterion PRS are shown in Table 35. The relationship between the score distributions is significant at the .01 level.

TABLE 35

Distribution Of Cecil County Follow-up Sample Classified By MSTOI Performance And PRS Total Scores

MSTOI Total Score		PRS Total Score		
		62 or Greater	Less than 62	Row Total
139 or Greater	N	39	1	40
	Row %	98	2	
	Col. %	71	4	51%
Less than 139	N	16	23	39
	Row %	41	59	
	Col. %	29	96	49%
Column Total	N	55	24	79
	%	70	30	100

Chi-square = 27.17 $P < .01$
Phi = .61

An analysis of the relationship between the MSTOI total scores and the PRS total showed a correlation coefficient of .81. The relationships between the subscales are shown in Table 36. The subscale scores correlate almost as highly as the total scores. The cognition subscale on the MSTOI shows the lowest degree of correlation with the PRS.

TABLE 36

Pearson Product Moment Correlation Coefficients Between MSTOI And PRS Scores For The Cecil County Follow-up Sample (N=79)

MSTOI Subscales	PRS Subscales							
	Auditory Comprehension	Spoken Language	Orientation	Motor Coordination	Personal/Social Behavior	Verbal	Nonverbal	PRS Total
Psychomotor	.76	.80	.79	.75	.78	.80	.83	.84
Language	.76	.80	.75	.70	.75	.79	.79	.82
Sensory/Perception	.75	.77	.75	.69	.76	.78	.80	.81
Cognition	.67	.73	.68	.66	.69	.71	.73	.74
Affect/Motivation	.76	.77	.75	.71	.79	.78	.81	.83
MSTOI Total	.75	.77	.74	.71	.75	.77	.79	.81

Note: All correlations significant at the .01 level.

The efficacy of the MSTOI as a predictor of academic success is indicated by the distribution of grade placement and MSTOI total scores. These data are shown in Table 37. Only one student scoring above the MSTOI cutoff score did not make normal school progress. The relationship between the two distributions was significant at the .01 level.

TABLE 37

Distribution Of Cecil County Follow-up Sample
Classified By MSTOI Performance And Grade Placement

MSTOI Score		Grade Placement		
		First	Second	Row Total
139 or Greater	N	1	39	40
	Row %	3	97	
	Col. %	4	71	51%
Less than 139	N	22	16	38
	Row %	58	42	
	Col. %	96	29	49%
Column Total	N	23	55	78
	%	29	71	100

Note: One grade placement missing.
Chi-square = 26.16 P < .01
Phi = .61

The second initial assessment administered was the Meeting Street School Screening Test (MSSST). The distribution of the MSSST total scores and the PIAT criterion measure are shown in Table 38. The relationship between the score distributions was significant at the .01 level. No student scoring above the MSSST cutoff fell below the PIAT cutoff score.

TABLE 38

Distribution Of Cecil County Follow-up Sample
Classified By MSSST Performance And PIAT Total Score

MSSST Total Score		PIAT Total Score		
		102 or Greater	Less than 102	Row Total
58 or Greater	N	26	0	26
	Row %	100	0	
	Col. %	46	0	38%
Less than 58	N	31	12	43
	Row %	72	28	
	Col. %	54	100	62%
Column Total	N	57	12	69
	%	83	17	100

Chi-square = 6.95 P < .01
Phi = .36

The predictive validity of the MSSST was determined by examining the relationship between the MSSST and the PIAT. A correlation of .82 was found for the total scores. The relationships between the subscales are shown in Table 39. All correlations are significant at the .01 level.

TABLE 39

Pearson Product Moment Correlation Coefficients Between MSSST And PIAT Total Scores For Cecil County Follow-up Sample (N=69)

MSSST Subscales	PIAT Subscales					
	Mathematics	Reading Recognition	Reading Comprehension	Spelling	General Information	PIAT Total
Motor Patterning	.70	.66	.70	.64	.60	.71
Visual Perceptual/Motor	.76	.72	.79	.70	.57	.76
Language	.80	.80	.81	.75	.73	.84
Total	.80	.77	.81	.74	.67	.82

Note: All correlations significant at the .01 level.

The predictive validity of the MSSST was determined by comparing the score distribution of the MSSST with the score distributions on the criterion measure, the PRS. This distribution is shown in Table 40. The relationship between the score distributions is significant at the .01 level. Every student exceeding the MSSST cutoff score also scored above the PRS cutoff point.

TABLE 40

Distribution Of Cecil County Follow-up Sample
Classified By MSSST Performance And PRS Total Scores

MSSST Total Score		PRS Total Score		
		62 or Greater	Less than 62	Row Total
58 or Greater	N	26	0	26
	Row %	100	0	
	Col. %	53	0	38%
Less than 58	N	23	20	43
	Row %	54	46	
	Col. %	47	100	62%
Column Total	N	49	20	79
	%	71	29	100

Chi-square = 14.84 $P < .01$
Phi = .50

The predictive validity of the MSSST also was assessed by determining the correlation between the MSSST and the PRS. The correlation coefficient between the total scores was .81. Subscore correlations are shown in Table 41. All correlations are significant at the .01 level.

TABLE 41

Pearson Product Moment Correlation Coefficients Between MSSST And PRS Scores For Cecil County Follow-up Sample (N=79)

MSSST Subscales	PRS Subscales							
	Auditory Comprehension	Spoken Language	Orientation	Motor Coordination	Personal/Social Behavior	Verbal	Nonverbal	PRS Total
Motor Patterning	.64	.69	.67	.58	.70	.68	.71	.72
Visual/ Perceptual Motor	.74	.71	.79	.64	.77	.74	.80	.79
Language	.76	.77	.69	.61	.76	.78	.75	.79
Total	.75	.77	.75	.64	.79	.77	.80	.81

Note: All correlations are significant at the .01 level.

Assessment of the predictive validity of the SCBI was made by examining the score distribution of the SCBI and the PIAT. These data are shown in Table 42. Unlike the other relationships in Cecil County sample, this relationship was not significant at the .01 level, but was significant at the .05 level.

TABLE 42

Distribution Of Cecil County Follow-up Sample
Classified By SCBI Performance And PIAT Total Scores

SCBI Total Score		PIAT Total Scores		
		102 or Greater	Less than 102	Row Total
15 or Greater	N	31	1	32
	Row %	97	3	
	Col. %	54	9	47%
Less than 15	N	26	10	36
	Row %	72	28	
	Col. %	46	91	53%
Column Total	N	57	11	68
	%	84	16	100

Chi-square = 5.88 $P < .05$
Phi = .33

The correlation between the SCBI total score and PIAT scores was determined. Correlation of total scores was .61. Subscore correlations are listed in Table 43. Total score and subscale scores are significant at the .01 level.

TABLE 43

Pearson Product Moment Correlation Coefficients Between SCBI Scores And PIAT Scores For Cecil County Follow-up Sample (N=68)

	PIAT Subscore					
	Mathematics	Reading Recognition	Reading Comprehension	Spelling	General Information	PIAT Total
SCBI Total	.58	.62	.63	.57	.51	.61

Note: All correlations are significant at the .01 level.

The distribution of SCBI scores with the PRS scores was examined in order to assess predictive validity of the SCBI. These score distributions are shown in Table 44. Only one student exceeding SCBI cutoff score in kindergarten failed to exceed the PRS cutoff score in the second grade.

TABLE 44

Distribution Of Cecil County Follow-up Sample Classified By SCBI Performance And PRS Scores

SCBI Total Score		PRS Total		
		62 or Greater	Less than 62	Row Total
15 or Greater	N	31	1	32
	Row %	97	3	
	Col. %	63	5	47%
Less than 15	N	18	18	36
	Row %	50	50	
	Col. %	37	95	53%
Column Total	N	49	19	68
	%	72	28	100

Chi-square = 16.23 $P < .01$
Phi = .46

The predictive validity of the SCBI was determined by e amining the strength of the relationship between the SCBI and the PRS. A correlation of .70 was found between the total scores. Subscale correlations are shown in Table 45. All correlations ranging from .63 to .74 are significant at the .01 level.

TABLE 45

Pearson Product Moment Correlation Coefficients Between SCBI Scores And PRS Scores For The Cecil County Follow-up Sample (N=68)

	PRS Subscores							
	Auditory Comprehension	Spoken Language	Orientation	Motor Coordination	Personal/Social Behavior	Verbal	Nonverbal	Total
SCBI Total Score	.74	.74	.73	.69	.78	.63	.72	.70

Note: All correlations significant at the .01 level.

Item Analysis

In order to assess the predictive validity of the MSTOI, an item analysis was performed. Each MSTOI item and subscore were compared to the MSTOI total score. Each item and subscore was compared to the total score of the criterion measures, the PIAT and the PRS. The relatively high correlations of the MSTOI subscores with the MSTOI total score should be noted.

TABLE 46

MSTOI Item Analysis Correlations Of Each Item With MSTOI Subscales And MSTOI Total Score For Cecil County Follow-up Sample (N=79)

MSTOI Item	MSTOI Subscale					
	Psychomotor	Language	Sensory/ Perception	Cognition	Affect/ Motivation	MSTOI Total
1	.82	.76	.80	.67	.80	.78
2	.82	.82	.83	.74	.86	.83
3	.90	.93	.90	.89	.87	.92
4	.61	.68	.66	.77	.55	.69
5	.71	.67	.69	.66	.67	.71
6	.86	.90	.88	.84	.84	.90
7	.73	.69	.69	.68	.77	.74
8	.76	.73	.75	.76	.63	.73
9	.90	.85	.85	.84	.91	.89
10	.88	.95	.91	.92	.86	.94
11	.87	.87	.87	.85	.89	.89
12	.80	.90	.86	.90	.72	.88
13	.59	.61	.63	.51	.59	.61
14	.71	.79	.77	.85	.66	.80
15	.44	.40	.40	.41	.61	.47
16	.88	.92	.95	.93	.84	.93
17	.67	.76	.72	.86	.61	.76
18	.76	.76	.77	.71	.79	.79
19	.68	.69	.71	.77	.58	.71
20	.73	.68	.70	.65	.81	.74
21	.74	.75	.80	.69	.77	.77
22	.54	.51	.50	.51	.68	.56
23	.83	.85	.79	.79	.68	.81
24	.84	.85	.86	.81	.87	.87
25	.60	.54	.54	.57	.71	.61
26	.75	.83	.84	.85	.71	.84
27	.56	.54	.50	.51	.71	.59
28	.89	.95	.92	.91	.83	.93
29	.74	.62	.62	.56	.67	.66
30	.84	.87	.91	.87	.77	.88
31	.76	.84	.84	.89	.72	.85
32	.81	.87	.86	.91	.74	.88
33	.79	.89	.85	.86	.69	.85
34	.82	.87	.88	.86	.75	.88
35	.83	.89	.91	.87	.79	.89
36	.88	.93	.93	.87	.84	.92
Psychomotor		.94	.94	.90	.91	.96
Language			.97	.96	.88	.98
Sensory/Perception				.95	.89	.98
Cognition					.84	.97
Affect/Motivation						.93

Note: All correlations significant at the .01 level.

TABLE 47

MSTOI Item Analysis
Correlations Of Each MSTOI Item And Subscale With The Total PIAT (N=79) And PRS (N=79) Criterion Measures For Cecil County Follow-up Sample

MSTOI Item	MSTOI Subscale						
	Psychomotor	Language	Sensory/ Perception	Cognition	Affect/ Motivation	PIAT Total	PRS Total
1	.82	.76	.80	.67	.80	.75	.70
2	.82	.82	.83	.74	.86	.78	.76
3	.90	.93	.90	.89	.87	.81	.79
4	.61	.68	.66	.77	.55	.53	.47
5	.71	.67	.69	.66	.67	.58	.61
6	.86	.90	.86	.84	.84	.82	.78
7	.73	.69	.69	.68	.77	.62	.58
8	.76	.73	.75	.76	.63	.67	.63
9	.90	.85	.85	.84	.91	.76	.80
10	.88	.95	.91	.92	.86	.82	.80
11	.87	.87	.87	.85	.89	.75	.78
12	.80	.90	.86	.90	.72	.71	.64
13	.59	.61	.63	.51	.59	.60	.50
14	.71	.79	.77	.85	.66	.60	.55
15	.44	.40	.40	.41	.61	.40	.49
16	.88	.92	.95	.93	.84	.81	.78
17	.67	.76	.72	.86	.61	.55	.50
18	.76	.76	.77	.71	.79	.65	.61
19	.68	.69	.71	.77	.58	.63	.58
20	.73	.68	.70	.65	.81	.65	.64
21	.74	.75	.80	.69	.77	.72	.75
22	.54	.51	.50	.51	.68	.45	.51
23	.83	.85	.79	.79	.68	.70	.69
24	.84	.85	.86	.81	.87	.79	.80
25	.60	.54	.54	.57	.71	.56	.56
26	.75	.83	.84	.85	.71	.64	.60
27	.56	.54	.50	.51	.71	.55	.58
28	.89	.95	.92	.91	.83	.82	.79
29	.74	.62	.62	.56	.67	.58	.59
30	.84	.87	.91	.87	.77	.79	.73
31	.76	.84	.84	.89	.72	.67	.57
32	.81	.87	.86	.91	.74	.69	.67
33	.79	.89	.85	.86	.69	.71	.63
34	.82	.87	.88	.86	.75	.73	.67
35	.83	.89	.91	.87	.79	.80	.71
36	.88	.93	.93	.87	.84	.82	.76
Psychomotor		.94	.94	.90	.91	.86	.84
Language			.97	.96	.88	.85	.82
Sensory/Perception				.95	.89	.87	.81
Cognition					.84	.79	.74
Affect/Motivation						.83	.83
MSTOI Total						.85	.81

Note: All correlations significant at the .01 level.

Discussion

The procedures used to select the sample for study in Cecil County present a problem for those wishing to generalize beyond the immediate sample. Since only those at the extreme ends of the score distribution for the MSTOI were chosen, the sample scores were not normally distributed; therefore, caution should be employed wher interpreting results from various statistical analyses. The difference between MSTOI mean total scores for those chosen and the total school population (145.2 vs. 140.65) should be noted. The resulting MSTOI score distribution is therefore not representative of the total school population. As far as may be inferred from the data, the MSTOI possesses both concurrent and predictive validity. A summary of the validity indices for the MSTOI in Cecil County is presented in Table 48.

TABLE 48

Summary Of Validity Indices For The MSTOI, SCBI, And MSSST In Cecil County

	X^2	r
Concurrent Validity		
MSTOI with MSSST	29.57	.68
MSTOI with SCBI	43.56	.76
Predictive Validity		
MSTOI with PRS	27.17	.81
SCBI with PRS	16.23	.70
MSSST with PRS	14.84	.81
MSTOI with PIAT	16.57	.85
SCBI with PIAT	5.88*	.61
MSSST with PIAT	6.95	.82

Note: All unstarred values significant at the .01 level.
*Values significant at the .05 level.

Inspection of the preceding table reveals that in terms of predictive validity, the MSTOI compares favorably with the other screening instruments, SCBI and MSSST. An examination of the Pearson Product Moment Correlation Coefficients shows that the predictive validity of the MSTOI exceeds or equals the values calculated for the other initial assessment instruments. For this sample, the MSTOI teacher rating scale is as valid as the individually administered MSSST in predictive validity for both criterion measures. The predictive validity of the MSTOI is larger than that of SCBI when the PIAT is used as a criterion measure. When the apparent difference between MSTOI coefficient of .85 and the SCBI coefficient of .61 was tested for significance, with the t-test, a significant difference was found.

The predictive validity was assessed by constructing a contingency table and calculating the significance of the relationship between assessment instruments and the criterion measures. Five of the six calculations performed showed the X^2 value was significant at the .01 level. The sixth value was significant at the .05 level.

The results of the item and subscale item analysis in this county was similar to that reported for the other counties with the exception that here (perhaps due to the sample selection procedures) the correlations reported were higher than in the other counties. The results may be summarized as follows: 1) all of the subscales had predictive validity coefficients significant at the .01 level for both criteria (PIAT and PRS total score), 2) all items related significantly to the total MSTOI score and to PIAT and PRS total score, 3) the intercorrelations among the various items and subscales were uniformly high. These results may be interpreted as suggested in discussions of the results from the other counties.

Additional evidence of the predictive validity of the MSTOI was observed when MSTOI scores were compared to student grade placement. MSTOI scores in the kindergarten were useful in predicting those students unlikely to make normal progress and were likely to be retained.

The validity coefficients obtained in this study were higher than the ones calculated in the other two counties. In fact, the values are much greater than found with most tests over a two year period. These findings are in part a result of the sampling procedure employed in the study. Caution should be used when attempting to generalize these results to a more typical group.

Results - Combined County

Due to the various testing procedures employed and to the different assessment instruments used, it was not possible to combine the results of all counties. Where it could be justified, results were combined. The combined MSTOI assessment is presented first since it gives statistical data about the instrument with a large number of students. These data are followed by the concurrent validity data for the MSTOI with the other initial assessment instruments. The predictive validity data for the MSTOI and the other initial assessment measures is presented. This is followed by the item analysis data for the combined sample.

The MSTOI was the common initial assessment instrument utilized in all three counties. A total of 1285 MSTOI assessments were administered. Analysis of the data showed a MSTOI mean score of 146.77 with a standard deviation of 21.25. Individual item means and standard deviations for the combined sample are shown in Appendix A, Table V.

As reported earlier, the MSTOI initial assessment means for the

individual counties were: Queen Anne's - 145.13, Wicomico - 149.10, and Cecil - 145.00. A one-way analysis of variance was performed to determine the significance of the difference existing among the means. The resulting F value of 5.72, which was significant at the .01 level, indicated the means were derived from different populations.

Analysis of the follow-up sample (N=695) showed a mean MSTOI value of 147.61 with a standard deviation of 22.25. A t-test was utilized to test for a significant difference between the means of the initial sample and the follow-up sample. A significant difference between means was not found. A one-way analysis of variance was performed to test for significant differences among the three follow-up means of 145.80 for Queen Anne's County, 151.06 for Wicomico, and 136.01 for Cecil County. The resulting F value of 16.88, which was significant at the .01 level, indicated the means were derived from different populations.

Concurrent Validity

It was possible to combine the data from Queen Anne's and Wicomico Counties in order to determine the overall concurrent validity coefficients since the MSTOI, CSAB and CBI were administered in both counties. The data for the combined scores for the MSTOI/CSAB distribution are shown in Table 49. The relationship was significant at the .01 level. It is important to note that only 12% scored above the CSAB cutoff score with the greatest proportion of students classified as above the MSTOI cutoff score and below the CSAB cutoff score.

TABLE 49

Distribution Of The Combined Scores For Queen Anne's County And Wicomico County Classified By MSTOI Performance And CSAB Total Scores

MSTOI Total Score		CSAB Total Score		
		128 or Greater	Less than 128	Row Total
139 or Greater	N	72	402	474
	Row %	15	85	78%
	Col. %	100	75	
Less than 139	N	0	137	137
	Row %	0	100	22%
	Col. %	0	25	
Column Total	N	72	539	611
	%	12	88	100

Chi-square = 22.15 P < .01
Phi = .19

The score distributions for the MSTOI and the CBI are shown in Table 50. The relationship between the score distributions is significant at the .01 level with the majority of the students either above the cutoff score or below the cutoff score on both tests.

TABLE 50

Distribution Of The Combined Scores For Queen Anne's County And Wicomico County Classified By MSTOI Performance And CBI Total Scores

MSTOI Total Score		CBI Total Score		
		32 or Greater	Less than 32	Row Total
139 or Greater	N	278	197	475
	Row %	59	41	77%
	Col. %	95	61	
Less than 139	N	13	127	140
	Row %	9	91	23%
	Col. %	5	39	
Column Total	N	291	324	615
	%	47	53	100

Chi-square = 103.21 P < .01
Phi = .41

The Pearson Product Moment Correlation Coefficients were calculated to determine the degree of relationship between the MSTOI and the CSAB and CBI. The Pearson Product Moment Correlation Coefficient for the MSTOI with the CSAB was .65, for the MSTOI with the CBI was .68. Both of these values are significant at the .01 level. For convenience, the individual county values and combined values are summarized in Table 51.

TABLE 51

Concurrent Validity Indices For The MSTOI With The CSAB and CBI for County And Combined Scores

Sample + Comparisons	X^2	r	n
Queen Anne's County			
MSTOI-CSAB	9.26	.72	227
MSTOI-CBI	56.52	.73	230
Wicomico County	11.29	.75	384
MSTOI-CSAB	49.68	.67	385
Combined Queen Anne's and Wicomico			
MSTOI-CSAB	22.15	.73	611
MSTOI-CBI	103.21	.68	615

Note: All relationships significant at .01 level.

Predictive Validity

By necessity, predictive validity for combined results was based on Queen Anne's County and Wicomico County data. Cecil County was not included in any combined results because of the sampling method used in that county. In Cecil County, the selection process of the highest and lowest performing students on the MSTOI was used to determine the follow-up sample. This selection procedure resulted in a nonnormal bimodal distribution of scores. Such a distribution, when combined with the other county scores, tends to produce

spuriously high correlations.

In order to determine the predictive validity of the MSTOI with the PRS as criterion for the combined follow-up samples, a contingency table was developed. The distribution of the 616 scores for the MSTOI total scores and the PRS total score for the combined follow-up scores for Queen Anne's and Wicomico Counties are shown in Table 52. A relationship significant at the .01 level was found with 487 of the 616 students similarly classified by both tests.

TABLE 52

Distribution Of The Combined Scores For Queen Anne's County And Wicomico County Classified By MSTOI Performance And PRS Total Scores

MSTOI Total Score		PRS Total Score		
		62 or Greater	Less than 62	Row Total
139 or Greater	N	423	53	476
	Row %	89	11	
	Col. %	85	45	77%
Less than 139	N	76	64	140
	Row %	54	46	
	Col. %	15	55	23%
Column Total	N	499	117	616
	%	81	19	100

Chi-square = 91.82 $P < .01$
Phi = .39

In order to determine the predictive validity of MSTOI for the combined samples, Pearson Product Moment Correlations were calculated for the MSTOI total scores with the PRS. The results are shown in Table 53. All of the Pearson Product Moment Correlation Coefficients indicating the strength of relationship between the MSTOI and the PRS scale and total scores were significant at the .01 level.

TABLE 53

Pearson Product Moment Correlation Coefficients Between MSTOI Total Scores And For The Combined Queen Anne's County And Wicomico County Follow-up Sample (N=616)

	PRS Subscales							
	Auditory Comprehension	Spoken Language	Orientation	Motor Coordination	Personal/Social Behavior	Verbal	Nonverbal	PRS Total
MSTOI Total	.49	.49	.45	.33	.50	.50	.49	.52

Note: All values significant at the .01 level.

Predictive validity of the CSAB and CBI was calculated. A summary of the individual county and combined county results is shown in Table 54. For the combined results, all predictive validity indices were significant at the .01 level. In terms of practical application, there appears to be little difference among the Pearson Product Moment Correlation Coefficients indicating the predictive validity of the various tests.

TABLE 54

Predictive Validity Indices For The MSTOI, CSAB, And CBI With The Criterion PRS For County And Combined Sample

Sample + Comparison	X^2	r	n
Queen Anne's County			
MSTOI-PRS	31.82	.53	230
CSAB-PRS	5.59*	.58	229
CBI-PRS	36.41	.69	231
Wicomico County			
MSTOI-PRS	46.80	.52	386
CSAB-PRS	8.36	.54	385
CBI-PRS	26.05	.45	386
Combined Sample			
MSTOI-PRS	91.82	.52	616
CSAB-PRS	11.70	.55	614
CBI-PRS	61.21	.47	617

Note: All unstarred values significant at the .01 level.
*Significant at the .05 level.

As further indication of the predictive validity of the MSTOI, the relationship between MSTOI scores and student grade placement for the combined samples was examined. The distribution of scores for 615 students in Queen Anne's and Wicomico Counties is shown in Table 55. For this combined sample, a significant relationship at the .01 level was observed. When interpreting this table, the reader should be aware that 3% of the students were retained.

TABLE 55

Distribution Of The Combined Sample Of Queen Anne's County And Wicomico County Follow-up Sample Classified By MSTOI Scores And Grade Placement

MSTOI Total Score		Grade Placement		
		Grade 1	Grade 2	Row Total
139 or Greater	N	6	469	475
	Row %	1	99	
	Col. %	29	79	77%
Less than 139	N	15	125	140
	Row %	11	89	
	Col. %	71	21	23%
Column Total	N	21	594	615
	%	3	97	100

Chi-square = 26.49 P < .01
Phi = .22

Item Analysis

The results of item analysis of the combined Queen Anne's County and Wicomico County MSTOI scores are presented in Table 56. All of the individual items are significantly correlated with the MSTOI subscale and total scores. Their values range from .39 to .80. In addition, the MSTOI subscale scores show a high positive relationship among themselves and with the MSTOI total score.

TABLE 56

Correlation Of Each MSTOI Item With Total MSTOI And Subscale Scores For The Combined Queen Anne's County And Wicomico County Sample (N=616)

MSTOI Item	MSTOI Subscale					
	Psychomotor	Language	Sensory/ Perception	Cognition	Affect/ Motivation	MSTOI Total
1	.76	.56	.63	.48	.61	.65
2	.64	.64	.65	.57	.64	.69
3	.57	.76	.66	.74	.50	.70
4	.56	.60	.59	.78	.47	.66
5	.53	.44	.39	.34	.55	.53
6	.63	.73	.53	.49	.57	.66
7	.48	.45	.33	.31	.64	.51
8	.69	.55	.70	.67	.46	.64
9	.78	.65	.69	.62	.78	.76
10	.65	.84	.69	.69	.59	.77
11	.73	.75	.71	.69	.72	.78
12	.58	.69	.63	.69	.45	.67
13	.37	.29	.24	.29	.47	.39
14	.46	.44	.45	.62	.38	.52
15	.44	.28	.23	.24	.69	.44
16	.53	.62	.74	.79	.49	.69
17	.59	.59	.65	.75	.45	.66
18	.47	.41	.32	.37	.58	.50
19	.55	.53	.60	.74	.45	.63
20	.60	.58	.55	.50	.65	.64
21	.51	.50	.67	.51	.43	.58
22	.43	.28	.29	.26	.67	.45
23	.61	.61	.43	.41	.43	.53
24	.73	.76	.73	.67	.75	.80
25	.49	.33	.35	.33	.70	.51
26	.51	.53	.65	.72	.46	.62
27	.56	.46	.46	.45	.75	.61
28	.59	.83	.67	.67	.55	.74
29	.56	.39	.30	.31	.54	.48
30	.56	.58	.77	.67	.43	.65
31	.50	.59	.62	.78	.41	.64
32	.56	.63	.65	.76	.49	.68
33	.57	.69	.55	.54	.51	.64
34	.58	.61	.73	.55	.49	.65
35	.49	.65	.65	.46	.46	.62
36	.52	.76	.66	.55	.47	.67
Psychomotor		.80	.81	.73	.83	.89
Language			.83	.82	.71	.92
Sensory/Perception				.86	.68	.91
Cognition					.64	.89
Affect/Motivation						.87

Note: All values significant at the .01 level.

The correlations of the MSTOI items and subscales with the criterion measure, the PRS, are shown in Table 57. Individual MSTOI item correlations ranged from .16 to .54 with the PRS total score. MSTOI subscale correlation coefficients ranged from .43 to .54 with the PRS total score.

TABLE 57

MSTOI Item Analysis
Correlation Of Each MSTOI Item For The Combined Queen Anne's County And Wicomico County Sample With The PRS Criterion Measure (N=615)

MSTOI Item	PRS Total
1	.43
2	.45
3	.39
4	.28
5.	.29
6	.37
7	.23
8	.28
9	.41
10	.40
11	.54
12	.37
13	.16
14	.21
15	.24
16	.35
17	.27
18	.25
19	.31
20	.39
21	.33
22	.23
23	.32
24	.54
25	.25
26	.31
27	.25
28	.45
29	.20
30	.33
31	.29
32	.35
33	.31
34	.39
35	.46
36	.47
Psychomotor	.50
Language	.53
Sensory/Perception	.51
Cognition	.43
Affect/Motivation	.48
Total	.54

Note: All correlation coefficients significant at the .01 level.

Discussion

The combined results were based on the Queen Anne's County and Wicomico County data. Cecil County data was not included in any of the combined results due to the sampling procedures employed in the county. In Cecil County the follow-up sample was composed of students that made the highest and lowest MSTOI scores. This selection process resulted in a nonnormal, bimodal distribution of scores. Such a distribution when combined with the other county scores tended to produce spuriously high relationships.

By excluding the Cecil County data, the resulting combined score distribution did not have greater than chance values for kurtosis and skewness. As a result, the assumption was made that the combined scores were normally distributed about the mean. Therefore, based on a normal curve distribution percentage of scores falling below the 139 cutoff, would be 35% or 243 cases. The observed or actual percentage was 26% or 178 cases for this combined sample. Both the expected and the actual percentages were somewhat lower than the 40% figure estimated from earlier studies. Several explanations are possible for such a discrepancy. First, some of the tests were administered as late as January. Since the MSTOI measures aspects of developmental growth, maturation and learning would tend to reduce the proportion falling below the cutoff score. Another explanation to be considered is the possibility of teacher bias in making student evaluations. A subconscious systematic bias may operate to reduce the number of students identified as being special. Finally, the sample studies may not truly represent the state population and therefore the percentage of identified cases should not be compared with the state norm.

The significantly higher MSTOI total for Wicomico County indicated that the overall level of kindergarten student performance

was better than for the other two counties. Although it was not possible to make CSAB comparisons among all three counties, it was possible to compare the CSAB scores for Wicomico and Queen Anne's Counties. Unlike the MSTOI mean score differences noted, the initial CSAB and CBI mean scores showed no significant differences.

The data analysis for the follow-up sample showed that the MSTOI mean scores were not significantly different for the initial and the follow-up samples. Therefore, (with the exception of Cecil County) comments concerning the follow-up sample can be generalized to the initial sample.

The concurrent validity was determined for the MSTOI with the CSAB and the CBI for the combined Queen Anne's and Wicomico Counties sample. Both of the calculated X^2 values were significant at the .01 level for the more than 600 score samples. The concurrent validity of the MSTOI was assessed further by determining the Pearson Product Moment Correlation Coefficients of the MSTOI with the CSAB and the CBI. The substantial correlations of .73 and .68 were interpreted as evidence that the MSTOI was measuring many of the same characteristics of student behavior as the other standardized measures.

The predictive validity of the MSTOI with the PRS as a criterion measure was assessed with the X^2 computation was significant at the .01 level. When the predictive validity of the MSTOI was assessed by the Pearson Product Moment Correlation Coefficient r value of .52 was obtained. There was no significant difference between the MSTOI correlation coefficient and the correlation coefficients for the CSAB and the CBI.

A significant relationship was shown between the MSTOI scores with student grade placement. This significant relationship was additional evidence of the predictive validity of the MSTOI.

For the combined sample, the item analysis data indicated that all of the individual items had a significant relationship with the MSTOI total scores and with the PRS criterion measure. All subscale scores also were significantly related to the MSTOI and the PRS total score.

SUMMARY

This longitudinal study was undertaken to assess the predictive validity of the MSTOI and other initial assessment instruments. The initial assessments were administered to the children during their kindergarten year. Criterion measures were administered to a sample of these children when they normally would be completing the second grade. In the interim period, no special remediation was done based on the initial test scores. Predictive validity of the MSTOI was determined by examining the relationship between student scores on the initial assessment instruments and scores on the criterion measures.

One of the outcomes of the study was the observation that the MSTOI has predictive validity for identifying students who have potential reading/learning problems. The predictive validity of the MSTOI compared favorably with the other initial assessment instruments. Predictive validity was determined by calculating contingency coefficients as well as by calculating Pearson Product Moment Correlation Coefficients. The contingency tables and the resulting X^2 indicate a significant relationship between the kindergarten MSTOI rating and the rating several years later. A note of caution: the magnitude of the X^2 value is related to the cutoff scores employed to dichotomize the score distributions. Cutoff scores, however, are related to school practices, are flexible and are easily changed to identify a particular proportion of the sample. The Pearson

Product Moment Correlation technique was employed to calculate the degree of relationship between variable scores representing an underlying continuum. All Pearson Product Moment Correlation Coefficients indicating the relationship between the MSTOI and the other assessment measures were significant at the .01 level.

In this study, a larger number of MSTOI scores were analyzed than were used in the initial norming study. Data analyzed here gives insight into the percentage of students being detected as needing further testing.

Another outcome of the study was the development of predictive validity data regarding the MSTOI and its relationship with school progress and retention. It was observed that students scoring below the MSTOI cutoff were more likely to be retained in grade than students scoring above the MSTOI cutoff score.

Further, the interrelationship of the MSTOI subscale scores with the MSTOI total score and criterion measures was calculated. MSTOI subscale scores were highly correlated with each other and with the MSTOI total score.

The item analysis of the MSTOI using a comparatively large sample size showed a significant correlation of all items with the total MSTOI score. Thirty-three of the thirty-six items had a correlation of .5 or better.

In addition to the predictive validity, the concurrent validity of the MSTOI was established by examining its relationship to the other initial assessment instruments. X^2 values and the Pearson Product Moment Correlation Coefficients were determined and all calculations were significant at the .01 level.

The favorable showing of the MSTOI in the study affirmed that

teachers rating students with a rating scale can predict student progress as well as some individually administered instruments.

Recommendation for Further Study

The results from this investigation of the MSTOI answer some questions and suggests others. The following suggestions and recommendations are provided with the hope that there will be optimal utilization of the MSTOI in the EIIP.

Although there was little evidence of teacher misscoring, considerations should be given to simplifying the MSTOI test form. The advantages and disadvantages associated with grouping items of the same subscale together should be investigated. The interpretation sheet could be simplified by eliminating the distinction between student scores of two and three during the observation. Since both the two and three are treated identically for indicating areas of further screening, the current system is unnecessarily complex.

In future studies, it would be advisable to involve the evaluation consultants in the design of the study. Involving the evaluation consultants would simplify the transfer of data to computer format. Machine scoring of MSTOI evaluations should be considered.

Future studies might focus on identifying and evaluating the progress of those students that score above the MSTOI cutoff score, but have a weakness in one or more of the areas of development. Intensive intervention with such youngsters may be the most effective use of educational resources.

This study investigated the predictive validity of the MSTOI over a two year time span with subjects who were not exposed to intervention procedures. It might be quite instructive to determine

the validity of the MSTOI with students when intervention procedures were available. It would be instructive to determine the reliability of the MSTOI over time utilizing students in school systems that provide intervention procedures.

There is a need to develop information concerning how the MSTOI scores are used by individual teachers for diagnostic purposes, individualizing instruction and as a basis for further testing. Although this study provided information concerning the validity of the MSTOI, it did not attempt to investigate the manner in which MSTOI scores are used or abused.

From a pragmatic point of view, a survey of the successful intervention methods used by teachers in the classrooms would be a small cost/good return study. It would be a source of information that could be used by teachers across the state.

A longitudinal study of the relationship between MSTOI score and classroom grades might provide some information not now available when standardized tests are used as the criterion measure.

A descriptive study documenting the proportion of students scoring above the MSTOI cutoff score, broken down by school system and year, could provide some useful information for those planning educational programs.

References

1. Curriculum and Evaluation Consultants, The Development and Validation of Screening Instruments for the Early Identification of Learning Disabilities. 197 .

2. Curriculum and Evaluation Consultants, An Evaluation of the Early Identification and Instructional Project of the Maryland State Department of Education. 197 .

3. Maryland State Department of Education, Guidelines: Early Identification and Instructional Programming for Learning Problems. 1975.

TABLE A

Means And Standard Deviations Of MSTOI Scores For The Queen Anne's County Initial Sample (N=305)

Item No.	Mean	Standard Deviation
1	3.24	.80
2	3.44	.99
3	3.92	.81
4	4.41	.74
5	4.11	.67
6	3.74	.83
7	4.31	.73
8	4.27	.95
9	3.74	.94
10	4.09	.83
11	3.68	.85
12	4.31	.79
13	4.68	.54
14	4.72	.47
15	4.27	.98
16	4.00	.86
17	4.47	.76
18	4.37	.74
19	4.51	.82
20	3.56	.82
21	3.53	.90
22	4.42	.78
23	4.32	.80
24	3.45	.96
25	4.38	.76
26	4.44	.65
27	4.19	.80
28	3.87	.86
29	4.32	.63
30	4.10	.95
31	4.34	.89
32	4.17	.73
33	4.50	.64
34	3.14	1.11
35	3.43	1.07
36	3.31	1.08
Psychomotor	19.61	3.64
Language	35.25	7.00
Sensory/ Perception	29.71	6.29
Cognition	37.72	6.94
Affect/ Motivation	44.21	7.89
MSTOI Total	145.13	20.27

TABLE B

Means And Standard Deviations Of CSAB Scores For The Queen Anne's County Initial Sample (N=305)

Competency Areas	Mean	Standard Deviation
Orientation	37.52	5.62
Coordination	9.70	1.97
Discrimination	26.71	4.60
Memory	31.05	6.88
Comprehension/ Concepts	36.95	7.59
CSAB Total	108.40	17.04

TABLE C

Means And Standard Deviations Of CBI Scores For The Queen Anne's County Initial Sample (N=308)

Subscale	Mean	Standard Deviation
Task Orientation	14.02	4.93
Extraversion	15.08	4.49
Prone to Frustration	4.23	3.80
Total Score	29.94*	7.54

*Prone to Frustration not included in total.

TABLE D

Means And Standard Deviations Of PIAT Scores For The Queen Anne's County Follow-up Sample (N=80)

Subtest	Mean	Standard Deviation
Mathematics	30.13	8.56
Reading Recognition	32.56	7.45
Reading Comprehension	31.44	8.02
Spelling	32.95	8.17
General Information	23.54	9.77
Total Test	150.79	33.24

TABLE E

Means And Standard Deviations Of The PRS For The Queen Anne's County Follow-up Sample (N=230)

Subscale	Mean	Standard Deviation
Auditory Comprehension	11.78	3.12
Spoken Language	14.63	3.63
Orientation	12.01	2.72
Motor Coordination	9.10	1.57
Personal/Social Behavior	24.77	5.57
Verbal Score	26.00[a]	6.83
Nonverbal Score	48.16[b]	9.72
Total Score	74.16	15.99

[a]Verbal Score includes auditory comprehension and spoken language subscale scores.

[b]Nonverbal Score includes orientation, motor coordination and personal/social behavior subscale scores.

TABLE F

Means And Standard Deviations Of MSTOI
Follow-up Sample for Queen Anne's County (N=230)

Item No.	Mean	Standard Deviation
1	3.25	.82
2	3.46	1.00
3	3.93	.82
4	4.43	.73
5	4.15	.64
6	3.73	.84
7	4.33	.73
8	4.34	.92
9	3.77	.95
10	4.12	.82
11	3.70	.86
12	4.33	.80
13	4.68	.55
14	4.73	.46
15	4.33	.94
16	4.03	.87
17	4.50	.76
18	4.39	.73
19	4.54	.78
20	3.58	.84
21	3.55	.89
22	4.47	.73
23	4.31	.80
24	3.48	.96
25	4.40	.75
26	4.46	.66
27	4.24	.79
28	3.88	.87
29	4.36	.61
30	4.10	.96
31	4.40	.85
32	4.22	.70
33	4.51	.64
34	3.20	1.09
35	3.46	1.07
36	3.32	1.09
Psychomotor	19.84	3.41
Language	35.51	6.67
Sensory/ Perception	30.11	6.01
Cognition	38.16	6.48
Affect/ Motivation	44.71	7.30
Total Score	145.80	20.60

TABLE G

Means And Standard Deviations Of CSAB Competency Areas For The Queen Anne's County Follow-up Sample (N=229)

Competency Areas	Mean	Standard Deviation
Orientation	37.90	5.41
Coordination	9.83	1.93
Discrimination	26.93	4.44
Memory	31.45	6.88
Comprehension/ Concept	37.40	7.60
CSAB Total	109.64	16.70

TABLE H

Means And Standard Deviations For CBI For Queen Anne's County Follow-up Study (N=230)

Subscores	Mean	Standard Deviation
Task Orientation	14.45	4.80
Extraversion	15.74	4.46
Prone to Frustration	3.92	3.57
Total	30.28*	7.61

*Prone to Frustration not included in total.

TABLE I

Means And Standard Deviations Of MSTOI Scores For The Wicomico County Initial Sample (N=546)

Item No.	Mean	Standard Deviation
1	3.46	.98
2	3.59	.99
3	4.04	.84
4	4.60	.71
5	4.04	.74
6	3.70	.95
7	4.34	.81
8	4.68	.73
9	3.99	.87
10	4.01	.93
11	3.86	.84
12	4.57	.65
13	4.50	.69
14	4.74	.54
15	4.20	.97
16	4.22	.91
17	4.63	.71
18	4.16	.91
19	4.69	.75
20	3.82	.90
21	3.64	.97
22	4.47	.75
23	4.42	.74
24	3.71	.90
25	4.43	.79
26	4.48	.67
27	4.05	.81
28	3.78	.97
29	4.12	.82
30	4.18	.97
31	4.49	.86
32	4.37	.82
33	4.41	.74
34	3.72	1.13
35	3.48	1.11
36	3.52	.97
Psychomotor	20.51	3.45
Language	36.00	6.62
Sensory/ Perception	31.51	6.09
Cognition	39.27	6.34
Affect/ Motivation	44.93	7.49
Total Score	149.10	19.95

TABLE J

Means And Standard Deviations Of CSAB Scores For Wicomico County Initial Sample (N=546)

Competency Areas	Mean	Standard Deviation
Orientation	38.15	5.59
Coordination	9.57	2.17
Discrimination	27.00	4.57
Memory	30.67	6.46
Comprehension/ Concept	36.97	7.89
CSAB Total	108.94	17.55

Note: Subscale total will not equal total since some items appear in more than one subscale.

TABLE K

Means And Standard Deviations Of CBI Scores For Wicomico County Initial Sample (N=546)

Subscale	Mean	Standard Deviation
Task Orientation	13.92	5.58
Extraversion	15.37	4.61
Prone to Frustration	6.12*	4.98
Total CBI	28.89	8.64

*Not included in computing total CBI.

TABLE L

Means And Standard Deviations Of PRS Scores
For Wicomico County Follow-up Sample (N=387)

Subscale	Mean	Standard Deviation
Verbal	28.07	7.27
Nonverbal	47.81	10.53
PRS Total	75.88	16.98

TABLE M

Means And Standard Deviations For MSTOI Scores
For The Wicomico County Follow-up Sample (N=386)

Item No.	Mean	Standard Deviation
1	3.50	.94
2	3.65	.96
3	4.10	.80
4	4.69	.59
5	4.09	.71
6	3.77	.91
7	4.38	.83
8	4.74	.69
9	4.06	.84
10	4.07	.93
11	3.90	.82
12	4.65	.59
13	4.56	.64
14	4.78	.46
15	4.23	.95
16	4.29	.86
17	4.67	.66
18	4.25	.84
19	4.76	.64
20	3.90	.88
21	3.67	.93
22	4.52	.71
23	4.48	.66
24	3.78	.88
25	4.47	.75
26	4.55	.61
27	4.08	.80
28	3.82	.97
29	4.19	.97
30	4.24	.89
31	4.54	.80
32	4.44	.76
33	4.46	.70
34	3.78	1.12
35	3.51	1.11
36	3.56	.96
Psychomotor	20.98	2.70
Language	36.75	5.53
Sensory/ Perception	32.19	5.03
Cognition	40.07	4.86
Affect/ Motivation	45.86	6.17
Total	151.06	18.33

TABLE N

Means And Standard Deviations Of CSAB Scores For Wicomico County Follow-up Sample (N=385)

Competency Areas	Mean	Standard Deviation
Orientation	38.64	5.16
Coordination	9.77	1.88
Discrimination	27.45	4.21
Memory	31.28	5.80
Comprehension/ Concept	37.50	7.12
CSAB Total	110.65	15.44

Note: Subscale total will not equal total since some items appear in more than one subscale.

TABLE O

Means And Standard Deviations Of CBI Scores For Wicomico County Follow-up Sample (N=386)

Subscale	Mean	Standard Deviation
Task Orientation	14.26	5.31
Extraversion	15.47	4.62
Prone to Frustration	6.01*	4.86
Total CBI	29.44	8.28

*Not included in computing total CBI.

TABLE P

Means And Standard Deviations Of MSTOI Scores For The Cecil County Population (N=435)

MSTOI Item	Mean	Standard Deviation
1	3.27	.93
2	3.50	.97
3	3.79	.93
4	4.75	.55
5	4.04	.71
6	3.48	.95
7	4.15	.84
8	4.64	.77
9	3.84	.90
10	3.93	.94
11	3.69	.91
12	4.21	.91
13	4.25	.83
14	4.58	.67
15	4.19	.94
16	3.98	.90
17	4.59	.83
18	4.10	.89
19	4.64	.84
20	3.74	.84
21	3.51	.97
22	4.50	.76
23	4.29	.89
24	3.51	.91
25	4.58	.69
26	4.23	.80
27	4.00	.77
28	3.80	1.01
29	4.11	.79
30	4.12	.93
31	4.45	.97
32	3.98	.95
33	4.19	.91
34	3.63	1.11
35	3.67	1.00
36	3.50	1.10
Psychomotor	20.14	3.18
Language	34.81	7.33
Sensory/ Perception	31.01	6.00
Cognition	38.38	6.31
Affect/ Motivation	44.29	6.85
MSTOI Total	145.00	23.19

TABLE Q

Means And Standard Deviations Of MSSST Scores For Cecil County Initial Sample (N=88)

Subscale	Mean	Standard Deviation
Motor Patterning	17.18	7.75
Visual/Perceptual Motor	16.22	6.33
Language	15.23	7.60
MSSST Total	48.43	20.68

TABLE R

Means And Standard Deviations Of PIAT Test Scores For Cecil County Follow-up Sample (N=79)

Item	Mean	Standard Deviation
Mathematics	32.29	11.85
Reading Recognition	34.27	13.02
Reading Comprehension	32.78	12.33
Spelling	33.39	12.51
General Information	28.17	12.52
Total	160.84	58.45

TABLE S

Means And Standard Deviations Of PRS Scores For Cecil County Follow-up Sample (N=79)

Item	Mean	Standard Deviation
Auditory Comprehension	12.87	4.49
Spoken Language	15.80	5.47
Orientation	13.59	3.99
Motor Coordination	10.39	2.79
Personal/Social Behavior	26.85	7.31
Verbal Subtotal	28.67	9.79
Nonverbal Subtotal	50.71	13.40
Total	79.38	22.40

TABLE T

Means And Standard Deviations Of MSTOI Scores For The Cecil County Follow-up Sample (N=79)

Item No.	Mean	Standard Deviation
1	3.11	1.27
2	3.23	1.45
3	3.58	1.31
4	4.54	.84
5	3.92	.84
6	3.27	1.30
7	3.92	1.09
8	4.14	1.13
9	3.56	1.21
10	3.62	1.29
11	3.48	1.27
12	4.03	1.25
13	4.09	1.04
14	4.44	.90
15	4.20	.94
16	3.67	1.26
17	4.30	1.16
18	3.89	1.18
19	4.11	1.34
20	3.49	1.15
21	3.33	1.34
22	4.43	.84
23	3.99	1.21
24	3.24	1.23
25	4.44	.87
26	4.09	1.09
27	3.92	.84
28	3.49	1.41
29	4.01	.99
30	3.97	1.17
31	3.97	1.48
32	3.72	1.39
33	3.82	1.29
34	3.37	1.46
35	3.39	1.41
36	3.20	1.49
Psychomotor	18.81	4.73
Language	32.48	10.75
Sensory/ Perception	22.07	8.67
Cognition	35.83	9.42
Affect/ Motivation	42.42	9.12
MSTOI Total	136.01	36.01

TABLE U

Means And Standard Deviations Of The MSSST Scores For Cecil County Follow-up Sample (N=79)

Subscale	Mean	Standard Deviation
Motor Patterning	14.47	9.36
Visual/Perceptual Motor	13.58	7.37
Language	12.73	8.76
MSSST Total	40.77	25.13

TABLE V

Means And Standard Deviations Of MSTOI Scores For The Combined County Initial Sample (N=1285)

Item No.	Mean	Standard Deviation
1	3.34	.93
2	3.52	.99
3	4.93	.87
4	4.61	.68
5	4.06	.72
6	3.63	.93
7	4.27	.81
8	4.57	.82
9	3.88	.90
10	4.00	.91
11	3.76	.87
12	4.39	.79
13	4.46	.73
14	4.68	.58
15	4.21	.96
16	4.09	.90
17	4.57	.77
18	4.19	.87
19	4.63	.80
20	3.73	.86
21	3.57	.95
22	4.47	.76
23	4.35	.81
24	3.58	.93
25	4.47	.75
26	4.39	.72
27	4.06	.80
28	3.81	.96
29	4.17	.77
30	4.14	.95
31	4.44	.90
32	4.19	.86
33	4.36	.79
34	3.55	1.14
35	3.53	1.07
36	3.47	1.04
Total	146.77	21.25

APPENDIX B

Description Of Assessment Instruments

The five initial assessments used were the Maryland Systematic Teacher Observation Instrument (MSTOI), the Classroom Behavior Inventory (CBI), the Self-Control Behavior Inventory (SCBI), the Cognitive Skills Assessment Battery (CSAB), and the Meeting Street School Screening Test (MSSST). The first three are teacher rating scales requiring teacher observation and no student responses. The last two require student responses. A brief description of each initial assessment follows.

Maryland Systematic Teacher Observation Instrument. Each child is assessed on the 36 items of the observation instrument. Each behavior is rated on a scale frequently, often, sometime, seldom, or never. Numerical scores range from one to five per item with a possible maximum total score of 180. Individual items are grouped under five subscales: psychomotor (3 items), sensory perception (8 items), language (9 items), cognition (9 items), and affect motivation (14 items). Several items are included under more than one subscale. Students with a total score of less than 139 were designated as being high risk students having potential reading/learning problems. This instrument was developed by the Maryland State Department of Education in cooperation with local learning agencies.

Classroom Behavior Inventory. The child is assessed on the 15 items that constitute this inventory. Each item is evaluated as belonging to one of seven categories: never, almost never, occasionally, half the time, frequently, almost always, or always. Numerical values of 0, 1, 2, 3, or 4 are assigned to these categories by equating the zero value to never and almost never while the two highest categories almost always and always are given in numerical value of four. Maximum

score is 60. Individual items are grouped into three subscales: task orientation, extraversion, and prone to frustration. Only the first two categories are included in computing the total score. For this study the cutoff score of 32 was established. Any student scoring less than 32 was identified as having potential learning/reading problems. This instrument was developed by Schaefer, Aaronson, and Small of the Montgomery County Public School System, Rockville, Maryland.

Self-Control Behavior Inventory. Each child is assessed with the eight items on this inventory. Each item is scored as rarely does, sometimes does, usually does, and almost always does. Numerical scoring of the items ranges from zero to three. Maximum test score is 24. For this study, a cutoff score of 15 was utilized. Any student having a total score of less than 15 was identified as having potential learning/reading problems. The test is available from Psychoeducational Resources, Inc. in Washington, D. C.

Cognitive Skills Assessment Battery. An individually administered battery requiring 20-25 minutes to administer. Information concerning the child's abilities in the five competency areas of orientation toward and familiarity with one's environment, coordination, discrimination, memory and comprehension and concept formation are determined. Items and competency areas were developed following examination of curricula currently followed, teacher interviews, and research in areas of primary school skills. Although the test developers did not provide a mathematics total score, one was used in this study. A previously developed scoring system, established a maximum score of 150 for the battery. A cutoff score of 128 was established to identify high risk students that have a potential learning/reading problem. The Cognitive Skills Assessment Battery was developed by

Ann E. Boehm and Barbara Slater. The battery is available from the Teachers College Press, Columbia University.

Meeting Street School Screening Test. This is an individually administered screening test developed to identify children that may have learning disabilities. The test requires approximately 15-20 minutes to administer. Three subtests compromise the test: motor patterning, visual/perceptual/motor and language subtests. Validity data are included in the manual where the relationship of MSSST to Illinois Test of Psycholinguistic Abilities and the Frostig Developmental Tests of Visual Perception is presented. The test was normed in 220 kindergarten and 274 first grade youngsters. The test is published by the Meeting Street School, Providence, Rhode Island.

The two criterion measures used in the study were the Peabody Individual Achievement Test (PIAT) and the Pupil Rating Scale (PRS). The former is an individually administered test, and the latter is a group test.

Peabody Individual Achievement Test. This is a wide-range screening measure of achievement in the areas of mathematics, reading, spelling and general information. This individually administered untimed test usually requires 30-40 minutes to administer and to score the battery. The subtests are designed so that no academic skills are required other than those specifically being measured. No writing is required of the subject. Test scoring is completely objective. The PIAT, copyrighted in 1970, is available from the American Guidance Services, Inc.

Pupil Rating Scale. This rating scale developed on the hypothesis that if areas of deficit are carefully defined and delineated, they can be observed and rated by regular classroom teachers who are in close contact with children. The classroom teachers observe and rate children in the five behavior areas: auditory comprehension, spoken language, orientation, motor coordination, and personal/social behavior. The twenty-four item rating scale is constructed in a manner such that each behavior is ranked on a one to five scale. Total and subscale scores are calculated. The PRS was copyrighted in 1971 and is available from Grune and Stratton, Inc.

APPENDIX C

Technical Notes

When confronted with a data analysis problem, the analyst must decide which statistical procedures should be utilized. The decision is based on the quality and quantity of the data. For this study, the X^2, Phi coefficient and the Pearson Product Moment Correlation Coefficient were the principal statistical techniques employed. The data developed enabled the evaluators to make inferences about the probability that observed differences or relationships were due to factors other than chance.

The X^2 technique is most commonly used as either a test of relationship or as a goodness of fit test. The goodness of fit approach assumes some theoretical score distribution such as a normal curve. A significant X^2 value indicates that the observed distribution does not fit the theoretical distribution. The X^2 used as a test of relationship tests the null hypothesis of no relationship between two variables. A significant X^2 value allows one to infer that there is a significant relationship between the variables under study. The latter approach appeared to be better suited to the needs of this study. When X^2 is used as a test of statistical significance it tests for the existence of a systematic relationship between two variables.

The X^2 technique most frequently used in this study was the X^2 corrected for continuity. This correction is especially appropriate when analyzing a 2 x 2 contingency table with N greater than 40. It also has the "advantage of incorporating a correction for continuity which markedly improves the approximation of the distribution of the computed X^2 to the chi-square distribution." (Siegel) When the sample is very large, even miniscule deviations will generate a statistically significant chi-square. This is because larger samples are much more likely to approximate the true relationship in the

universe. On the other hand, a small sample is much more likely to contain a disproportionate number of atypical cases.

If no relationship exists between two variables in the sample under study, then any deviations from the expected values which occur in a table based on randomly selected sample data are due to chance. While some small deviation reasonably can be expected due to chance, large deviations, i.e. large values of chi-square, are unlikely. Since the actual relationships in the universe are unknown, small values of X^2 are interpreted to indicate the absence of a relationship, often referred to as statistical independence. Conversely, a large chi-square indicates that a systematic relationship of some sort exists between the variables.

By itself, chi-square value helps in making the decision whether the variables are independent or related. It does not indicate the strength of the relationship. The magnitude of the X^2 is influenced by the factors sample size and contingency table configuration. A statistical technique which adjusts for these factors is phi.

For a 2 x 2 tables, the phi statistic is a suitable measure of association, i.e. a measure of strength of relationship. Phi makes a correction for the fact that the value of chi-square is directly proportional to the number of cases N by adjusting the X^2. Phi takes on the value of 0 when no relationship exists, and the value of 1 when the variables are perfectly related, i.e. all cases fall just on the main or the minor diagonal.

The Pearson Product Moment Correlation provides a single number which summarizes the relationship between two variables. These

correlation coefficients indicate the degree to which variation (or change) in one variable is related to variation (change) in another. A correlation coefficient not only summarizes the strength of association between a pair of variables, but also provides an easy means for comparing the strength of relationship between one pair of variables and a different pair. Of course, this technique is limited to interval and ratio level variables.

Statistical Procedures and Computer Programs

The evaluation consultants employed the "Statistical Package for the Social Sciences" (SPSS) as the source of the computer programs needed to analyze the data. SPSS is an integrated system of computer programs designed for the analysis of data in the social sciences. It provides a large number of statistical routines and a good system for data transformation and file manipulations. The SPSS package provides in a simple and convenient manner a comprehensive package that allows the researcher to utilize many different types of data analysis including chi-square analysis of variance, correlations and t-tests. This package is one of the most widely used packages of statistical procedures used in the country.

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